PUBLIC AND PRIVATE SECTOR INVOLVEMENT IN THE PROVISION OF ELECTRICITY IN URBAN AREAS OF SOUTH AFRICA

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Declaration

I declare that this dissertation is my own original work. It is being submitted in partial fulfilment of the requirements for the degree of Master of Science in Engineering at the University of Cape Town. It has not been submitted before for any degree or examination at any university.

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ABSTRACT

This study examines the involvement of public and private sector institutions in the provision of electricity in urban areas of South Africa. Access to electricity in South Africa is highly unequal and little progress is currently being made to bring electricity to all, mainly due to institutional and financial problems. The focus on public and private sector roles is adopted because of the social importance and economic nature of electricity provision, the global and national significance of privatisation policies, and the current importance of allocating appropriate roles to the public and private sectors in widening access to services, including electricity, in South Africa.

The distribution sector of the South African electricity supply industry (ESI) is highly fragmented. Municipal electricity departments, which mostly serve white residential, commercial and industrial areas, are generally highly profitable and provide an effective service, but are not highly efficient by international standards. These departments are self-sufficient in the implementation of electrification projects, and have access to adequate capital to finance such projects. Electricity distribution authorities set up to serve black areas, especially electricity departments of black local authorities, are ineffective, and often financially unsound. Due to the weakness of public authorities charged with the task of undertaking electrification projects in black areas, the implementation of these projects is dependant on the involvement of private electrical consultants and contractors. However, few such projects are currently being undertaken due to inappropriate planning and shortages of concessionary finance.

After close consideration of the benefits and drawbacks of public and private involvement in range of activities that arise from electricity provision, it is concluded that the key challenges facing the ESI in South Africa will best be met if the distribution sector is restructured on a regional basis in order to utilise existing expertise, and retained within the public sector. Accelerated electrification initiatives, planned and co-ordinated by these distribution authorities, would draw upon the experience and capabilities of private electrical consultants and contractors. Public sector leadership in mobilising both public and private investment would also be necessary. Thus, whilst public institutions would be dominant, important roles would remain for the private sector in the provision of electricity in urban areas. The results of this study suggest that far from privatising service provision in South Africa, it will be essential to allocate a dominant role to the public sector in widening access to services to all.

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER ONE

INTRODUCTION

Energy shortages exist in underdeveloped rural and urban areas of South Africa. There is no overall energy shortage in the country, only unequal access to energy resources. This is particularly true of electricity, a key secondary energy resource. Whilst there is currently surplus generating capacity on the national grid, electricity is only provided to the homes of a minority of the population and to users in the developed sector of the economy. The majority of the population who live in unelectrified rural and urban areas are dependent on more expensive and less convenient energy sources, both for use in their homes and in small-scale productive activities. Electricity is currently only available to the homes of approximately one third of the population (Dingley,1990:6).

The structure of the distribution sector of the electricity supply industry (ESI) reflects these inequalities. Electricity distribution authorities are currently located within the racially segregated system of local government. White municipalities generally have well developed electricity departments which mostly serve only the areas under their jurisdiction. These areas are generally entirely electrified. In black residential areas, black local authorities (BLAs) were created in the 1980's to provide services on an independent basis. For a variety of reasons which will be explored later, most BLAs have failed to function effectively. Only a minority of homes in black urban townships are electrified.

The rate at which access to electricity is being extended in different areas also indicates a racial bias. The number of consumers in white municipal areas is increasing relatively slowly with the increase in the number of new homes and other facilities. Electrification of these areas is carried out by white municipal electricity departments. In contrast, little progress is currently being made to extend access to electricity in black urban areas. This task is the responsibility of BLAs and the Provincial Administrations, who also make use of private consultants and contractors. Relatively few new electrified formal houses are being constructed in these areas. No schemes are under way to electrify substantial numbers of houses in established townships. In new site-and-service schemes, full electricity systems are not being installed.

The reasons for the inequalities of access to electricity in urban areas and the blockage in extending access in black areas, are primarily institutional and financial. Linked as it has been to apartheid structures, the ESI has yet to establish a workable institutional framework within which to finance, install and operate new electrical services in all urban areas. This impasse has given rise to a debate about the appropriate institutional forms to undertake these tasks in the future. This debate has of course occurred in parallel with a range of similar debates about institutional change in South Africa. One aspect running through these discussions has been the question of assigning appropriate roles to the public and the private sector, in the economy generally and in the provision of services.

This study examines the involvement of private and public sector institutions in the provision of electricity in urban areas of South Africa. The term "provision" is taken here to imply both the distribution of electricity to existing consumers and the process of extending the grid to new consumers. The focus of this study on the mix of public and private sector involvement in electricity provision has been adopted for a number of reasons, which are outlined below.

The Nature of Electricity Provision as an Economic and Social Activity

For a number of reasons, electricity distribution authorities have potentially unrestrained power to set electricity tariff levels. Firstly, the distribution of electricity is a natural monopoly activity because of the waste inherent in the duplication of electricity distribution networks. Secondly, economies of scale in the operation and maintenance of electricity networks tend to ensure that electricity distribution in urban areas is carried out by large organisations, covering a sizeable area. Thirdly, most electricity consumers are unlikely to switch to alternative fuels once they have become dependent on electricity. In the light of their power to set tariffs independently, a debate arises as to the respective roles of public and private sector organisations in deal with this problem. Ordinarily, distribution authorities are either publicly owned and run, or they are privately owned, but operate under regulation by a public authority.

The social importance of electricity leads almost inevitably to some public sector

involvement in its provision. Electricity is both a consumer and a producer good. It is consumed by appliances which provide light and warmth, heat water, cook food and provide entertainment. At the same time, electricity is used to produce useful goods and services. Thus, electricity has the potential to raise the standards of living those who have access to it in their homes; and its availability and cost affect the potential for economic development. For these reasons states have often justified the creation of public sector institutions to extend access to electricity in underdeveloped regions.

Privatisation

The second major reason for the focus of this study on issues of public and private sector involvement in electricity provision is the phenomenon of privatisation. Privatisation has been a prominent issue in public policy debates over the last fifteen years in a wide range of countries around the globe. It is not intended here to trace the development of support for the policy of privatisation in any detail. That task has been undertaken in a number of excellent works, including those by Cook and Kirkpatrick (1988), Vickers and Yarrow (1988), and Goodrich and Gayle (1990). Only a few explanatory observations will be made here.

"Privatisation" is defined by Cook and Kirkpatrick (1988:3) as a range of different policy initiatives designed to transfer economic activity from the public sector to the private sector. Privatisation may therefore describe the change in the ownership of an enterprise, or part of an enterprise, from the public to the private sector. It may also describe the deregulation of entry into activities previously restricted to public sector enterprises. Finally, privatisation may refer to the contracting out of activities previously performed by the public sector.

According to Brett (1988), a distinctive feature of the period from the 1930's up to the end of the 1960's was the growing involvement of the state in the economies of almost all countries. In addition, many development theorists writing in that period assumed that market processes could not provide adequate basic services and ensure long-term economic stability. In a wide range of countries the role of the state in planning was emphasized, and large, centralised and monopolistic public enterprises were established to control the economy and

produce certain goods and services.

In the 1970's a number of complex and inter-related events gave rise to a generalised downturn in the global economy. These events, which are described in some detail by Lipietz (1985), are interpreted differently by different schools of economists. In the face of declining private sector profitability in some developed countries, conflict developed in state -- private sector relations. In some cases, the consensus which had previously existed around high levels of state service provision and taxation was replaced by open antagonism. Pressure was exerted on the state to facilitate new opportunities for private sector investment. Strategies that were suggested included the elimination of state monopolies through deregulation, the reduction of legal and financial barriers to market entry, price de-regulation, greater contracting out, and the sale to private investors of public sector corporations.

On the other hand, states were pressured to cut public spending and to reduce their roles in economies. This, it was argued, could be achieved by reducing the subsidisation of declining public sector industries; slowing expenditure growth on welfare services and public infrastructure; introducing cost-recovery pricing in the provision of saleable services; reducing staffing levels in public corporations and the state; and disciplining public sector trade union wage demands.

The public popularity of privatisation grew towards the end of the 1970's in a number of industrialised countries, notably the United Kingdom and the United States. Conservative governments led by Margaret Thatcher and by Ronald Reagan came into office in 1979 and 1981 respectively. Both were elected on the basis of promises to reduce public expenditure and taxation, and restore economic prosperity.

The effect of privatisation has been felt in countries all over the world. Different local circumstances have given rise to different levels of support and opposition in each country. Fraser (1988) provides a useful account of the global scope of privatisation initiatives. Amongst the variety of privatisation programmes devised in the 1980's three are worthy of special mention.

The first is the privatisation programme pursued by the British Conservative Party government under Margaret Thatcher. Between 1979 and 1990 a range of public

enterprises were sold to private interests for over £33 billion (R165 billion) (The Economist,1990a:70). As a result of these asset sales, direct provision of a number of services by the state has been replaced by private provision under state regulation. The state-owned electricity supply industry is currently being sold off in stages. While the balance of public and private ownership of productive assets in the British economy has been substantially altered, it not yet clear what the long term effect on the economy will be. The 1980's was a period of rapid growth for the British economy. Between 1983 and 1988 an average growth rate of 3.7% per year was maintained (Fishburn,1990:30). Since 1988 the economy has grown much less strongly. Also, it is not clear whether the quality of services provided by newly privatised companies will be better or worse than their publicly owned predecessors.

The second significant privatisation programme is that which has been pursued by the World Bank, the International Monetary Fund (IMF), and other major international credit agencies and aid organisations. The structural adjustment programmes advocated by these organisations have forced debt-burdened countries to implement privatisation policies in exchange for relief from debt obligations. All recent recipients of aid from the World Bank and the IMF have implemented structural adjustment programmes to a greater or lesser extent. As a result, some countries have been able to reschedule or meet their debt obligations. On the other hand, structural adjustment programmes have also resulted in considerable hardship and suffering amongst populations in a number of indebted countries. Once again, it is not clear what the long term effects of these programmes will be (Onimode,1989).

Finally, the collapse of socialist regimes in Eastern Europe has given rise to the formulation of privatisation programmes of unparalleled scope. In a number of countries and regions, notably Poland and eastern Germany, private ownership is being rapidly re-introduced. In these countries private-ownership commonly accounted for between 3 and 10% of the economy prior to the process of transformation. Special state appointed holding companies have been formed to sell off or disband thousands of state-owned enterprises. Economic policy documents circulating at the start of 1991 in the Soviet Union propose that up to 70% of state-owned assets be sold off to private owners or to local collectives (Fishburn,1990:43). Once again, the results of these privatisation initiatives in terms of the long-run performance of these economies is not at all certain.

Privatisation in South Africa

South Africa is often cited as a country in which the interventionist approach to economic development was particularly successful (Cook and Kirkpatrick,1988:48). The establishment of Iscor, Eskom and other public corporations in the 1920's helped to facilitate the rapid industrialisation of the country.

The effect of the global economic crisis of the 1970's on South Africa has been described in Saul and Gelb (1986). The South African economy has performed poorly for the last decade. Between 1980 and 1990 real gross national product (GNP) rose on average by less than 2% per annum. During the same period, the population grew by 2.4% per annum. This decline in real GNP per capita contributed to growing unemployment and poverty, and limited the resources available for development initiatives (The Economist,1990b).

After the recession of the 1970's support for the restructuring of the economy grew. Yet Thomas (1988) notes that support for privatisation in South Africa has not been especially widespread, and has been strongest in white business circles. The publication of the book "Assault on Free Enterprise" by A. Wassenaar in 1977 was the first major public expression of support for privatisation.

The National Party political establishment was slow to support the idea of privatisation. Thomas (1988) points out that this was perhaps to be expected, given the long history of active intervention in the economy by the apartheid state. At two meetings between the government and representatives of business leaders, the 1981 Carlton Conference in Johannesburg and the 1986 Indaba in Pretoria, slow progress was made on the formulation of proposals for a privatisation programme. In 1987, the White Paper on Privatisation and Deregulation in the Republic of South Africa was published. In the paper the government declared itself to be in favour of reducing the involvement of the state in the economy. It committed itself to budgetary restraint and declared itself to be in favour of the sale of public assets to the private sector under certain conditions. It argued that these enterprises should not be of strategic importance, nor should they be monopoly operators (South Africa,1987).

According to Fine (1988) two factors underpinned government support for the

privatisation of large public corporations. Firstly, cash raised in this way could be used to settle treasury debts, particularly foreign debts which international bankers were unwilling to reschedule at the time. Secondly, the government believed that by privatising service provision, it could relieve itself of some of the responsibility and costs of providing social welfare to all South Africans.

Thomas (1988) argues that the public debate in South Africa over the policy of privatisation has been somewhat superficial. Many of the viewpoints expressed have been ideologically motivated. Views based on strongly held beliefs in the virtues of either public or private ownership tend to obscure valid observations about the interaction of both types of institution in particular sectors of the economy.

At the opening of Parliament in 1988, State President P.W. Botha announced that a number of large publicly-owned corporations, including Eskom, were to be considered for sale to private investors. Late in 1989 Iscor, the publicly owned steel corporation, was sold to private investors and listed on the Johannesburg Stock Exchange.

Despite these statements and activities, government support for privatisation has waned since the 1987 White Paper in the face of resistance from three main quarters. Firstly, the predominantly white civil service has opposed privatisation, fearing that job losses, particularly amongst unskilled whites, would be likely under private ownership. Secondly, the powerful Congress of South African Trade Unions (Cosatu) has been very outspoken in its rejection of privatisation. Their opposition has been based on fears of job losses, as well as on ideological grounds. Thirdly, most extra-Parliamentary political leaders in South Africa are opposed to privatisation. Many argue that a future democratic state should play a more, not less, interventionist role in the economy. For example, an economic policy discussion paper distributed by the African National Congress (ANC) proposes that an ANC government of the future would re-nationalise public enterprises privatised by the present government (ANC,1990). As a result of these pressures, there were no major privatisation initiatives in 1990.

Yet the issue of privatisation cannot be considered to be entirely settled. South Africa is increasingly being exposed to interaction with the outside world, where privatisation remains a prominent policy initiative. Interaction with foreign

governments and organisations such as the World Bank in the future is likely to reintroduce debates about the relevance of privatisation to the South African economy.

Institutional Development in Electricity Supply Industries

The final reason for the focus of this study on public and private sector roles in electricity provision is the fact that such institutional issues are inevitably raised around the world as ESIs grow and change. Collier (1984) and Munasinghe (1989) note that institutional problems are usually the main obstacle to adequate provision of electricity in less developed countries. In situations where the number of consumers served and electricity consumption are increasing it is likely that periodic institutional restructuring will be necessary. Even in industrialised countries, where electricity is universally available, institutional restructuring has been undertaken from time to time, often prompted by changes in overall economic policy. The privatisation of the ESI in Britain, mentioned above, is a case in point. In the USA, many investor-owned electric utilities are currently faced by declining levels of profitability and have argued strongly for the re-organisation of the regulatory system under which they operate (Plummer et al,1985).

A number of countries which have recently made significant advances in electrifying new areas have initiated fresh programmes by restructuring their ESIs. Dingley (1990) notes that Thailand, Jamaica, India and Ireland had undertaken ambitious electrification programmes after establishing new institutions to provide electricity to unelectrified areas, and to co-ordinate extensions to existing networks. As was pointed out above, institutional and financial problems, rather than technical constraints, have delayed the electrification effort in South Africa. This study is intended to examine the current structure of the distribution sector of the ESI in South Africa in order to identify some of the reasons for these problems.

New national priorities have emerged in South Africa as a result of political change. Electrification of currently unelectrified areas is likely to become a national priority. The second part of this study is therefore prescriptive rather than descriptive, and seeks to identify appropriate roles for public and private

sector institutions in the provision of electricity in urban areas in the future.

Scope of the Study

This study is not concerned with the generation of electricity, or its transmission from the point of generation to the boundaries of urban areas. In addition, the scope of the study has purposely been restricted to the consideration of urban areas. The more complex set of problems raised by the provision of electricity to rural areas could not be addressed within a study of this scale.

Research Methodology

The focus of this study was identified as a result of the observation by the study supervisors and the author that institutional questions relating to the provision of public services in South Africa were likely to become increasingly important. After formulating a detailed research proposal, a review of available literature on privatisation, growth and development of ESIs, and design of institutions in developing countries was undertaken. A number of journals and published works were useful in this regard.

Despite its importance in the economy and in public policy discussions, very little has been written about the distribution sector of the ESI in South Africa. Since 1986, Dingley (1988 & 1990) has done work in this field. In addition, the proceedings of a number of conferences dealing in part with this topic have been published.

As a result of this scarcity of secondary information, primary sources were used extensively in this study. Thirty-two interviews were conducted with individuals working in the ESI and related organisations between August and November 1990. In the course of writing this thesis, organisational publications such as annual reports and information sheets have also been used. All sources have been referenced in the text. The dates used to reference publications is the year of publication (thus, for example, the Eskom 1989 Yearbook is (Eskom,1990b)).

Terminology

The use of racial categories is unfortunately inevitable when describing government structures and policies in South Africa. Where racial categories are used, this is done out of necessity and not by choice.

Dissertation Structure

The first three chapters after this introduction (chapters two, three and four) are primarily descriptive. Chapter two describes the range of existing electricity distribution authorities. These six different types of institutions are described and assessed in terms of a range of criteria. In chapter three the institutions involved in the implementation of new electrification projects are described. Different types of electrification projects are identified, depending on the nature of the area being electrified. The roles played by public sector institutions and private operators in each of these project types are described and assessed. In chapter four the financing of electricity provision is described. The various sources of finance available to distribution authorities, both in the form of direct payments and long-term loans, are described. The effectiveness of the current system of financing electrification projects is assessed.

The next three chapters (chapters five, six and seven) are more prescriptive. Their contents are necessarily less factual and more speculative. The general topics addressed in chapters five, six and seven are the same as those addressed in chapters two, three and four respectively. Chapter five assesses the advantages and disadvantages of both public and private ownership of distribution authorities. Suggestions are made concerning the ownership structures of restructured distribution authorities which might be needed to accelerate the electrification effort. In chapter six appropriate roles for public and private sector institutions in the accelerated implementation of new electrification projects are suggested. Finally, in chapter seven, ways are suggested to mobilize greater amounts of both public and private sector investment for use in electrification projects.

The final chapter, chapter eight, is a brief conclusion which draws together the major findings of the study.

CHAPTER TWO

ELECTRICITY DISTRIBUTION AUTHORITIES IN URBAN AREAS OF SOUTH AFRICA

2.1 Introduction

Based upon a compilation of data in the most up-to-date statistical sources, there are currently approximately 2.5 million end consumers of electricity in South Africa. Some 2 million of these are domestic users (Eskom,1990b). Other estimates of the total number of domestic consumers are higher, around 2.4 million (Dingley,1990:6). Using the higher figure, and assuming that five people live in each electrified home, about 12 million people have access to electricity in their homes. The population of South Africa in 1989 (including the "homelands") was 36.5 million people (The Economist,1990b:3). Thus about one third of the country's population live in electrified homes.

Six different kinds of distribution authorities exist in South Africa. These are white municipalities, Black Local Authorities, Regional Services Councils, Eskom, "homeland" corporations and municipalities, and privately owned distribution authorities. Most of these distribution authorities purchase all of the electricity that they sell from Eskom, the national generating authority. Apart from bulk sales, Eskom also supplies electricity directly to a number of other, usually large, consumers. Table 1 shows the total number of end consumers served by each kind of distribution authority, broken down by consumer type. Table 2 shows the number of units distributed by each kind of distribution authority, again broken down by consumer type.

In this chapter the distribution sector of the South African electricity supply industry will be described. The structure of the chapter is as follows. In the first section, the origins and development of the South African ESI will be very briefly described. Special emphasis will be placed on the distribution sector of the industry. The intention of this section will be to show how the institutions

Table 1. Numbers of Consumers Served by the Electricity Supply Industry in 1989.

	Eskom [1]	White Municipalities	Black Local Authorities	Regional Services Councils [2]	"Homeland" Corporations and Municipals [3]	Private Corporations [4]	Total in each category
Industry & commerce	14 526	181 591	1 894	146	2 227	-	200 384
Mining	565	0	0	0	-	0	565
Traction	34	0	0	0	-	0	34
Rural	110 121	0	0	0	-	0	110 121
Domestic	103 098	1 715 537	205 227	8 140	7 819	1 500	2 041 321
Not defined or other	0	81 167	400	130	35 159	200	117 056
Total number of consumers served	228 344	1 978 295	207 521	8 416	45 205	1 700	2 469 481
% of all consumers	9.3	80.1	8.4	0.3	1.8	0.1	100

Source: Eskom,1990b; [1] Excludes bulk consumers; [2] Atlantis and Blue Downs only; [3] Tescor, Becor and Vecor only. Excludes bulk consumers; [4] KwaNolec only (VanZyl,1990)

Table 2. Units of Electricity Distributed to End Consumers in 1989 [GWh].

	Eskom [1]	White Municipalities	Black Local Authorities	Regional Services Councils [2]	"Homeland" Corporations and Municipals [3]	Private Corporations [4]	Total in each category
Industry & commerce	35 820	29 365	35	195	138	-	65 553
Mining	34 661	0	0	0	-	-	34 661
Traction	4 229	0	0	0	-	-	4 229
Rural	3 438	0	0	0	-	-	3 438
Domestic	1 221	16 714	1 566	44	45	-	19 590
Not defined or other	0	4 283	139	3	1 356	-	5 781
Total number of units distributed	79 369	50 362	1 740	242	1 539	-	133 252
% of all electricity distributed	59.6	37.8	1.3	0.2	1.1	-	100

Source: Eskom,1990b; [1] Excludes bulk consumers; [2] Atlantis and Blue Downs only; [3] Tescor, Becor and Vecor only. Excludes bulk consumers; [4] KwaNolec only (van Zyl,1990)

responsible for electricity distribution have changed since electricity was first introduced in South Africa in 1882.

Next the six different types of existing distribution authorities will be described. The first two, white municipalities and black local authorities, which have been charged with the main responsibility for distributing electricity to domestic users, will be discussed in some detail. The last four, Regional Services Councils, Eskom, "homeland" corporations and municipalities, and privately owned distribution authorities, will be dealt with more concisely. Given the focus of this study on institutional issues, the institutional form and goals of each distribution authority type will be described. Next, three aspects of their performance will be assessed. These aspects are their financial performance, their economic efficiency and their effectiveness. These terms will be explained below. These aspects have been chosen since they provide a picture of the current status of the distribution sector of the ESI. Also, this information will allow for an assessment in later chapters of how the industry might be changed by assigning different roles to the public and private sector.

Based on the concepts raised by Cook and Kirkpatrick (1988), the financial performance of electricity distribution authorities will be assessed by considering two financial indicators. The first is the distribution authority's level of profitability. This is indicated by the size of the profit or surplus it generates on an annual basis, after meeting all other financial commitments. Depending on the nature and institutional form of the distribution authority this surplus may be transferred to a municipal or central state treasury, paid out to private shareholders, or spent on other special projects.

The second indicator that will be used is a measure of the relative indebtedness of distribution authorities. Different distribution authorities operate under different financial systems and constraints. As a result, their debt commitments will be different. Publicly owned distribution authorities may have greater debt, but also have access to capital at subsidised interest rates. They may receive financial assistance from the state if they are unable to meet their debt commitments. Privately owned distribution authorities may or may not operate under such conditions. In general, however, the extent of an distribution authority's external debts, relative to its assets and revenue, and the extent to which it is able to properly meet interest and other repayments on that debt,

provide a good indication of its financial well-being. The relative indebtedness of each type of distribution authority which exists in South Africa will be examined in turn.

As was noted in chapter one, the monopoly power of electricity distribution authorities gives them greater control over setting tariffs than enterprises in competitive business environments. As a result, a distribution authority may perform well according to the indicators of financial performance noted above, but not operate efficiently or effectively. Good financial performance is therefore not the only useful indicator of the performance of distribution authorities.

Economic efficiency of distribution authorities is the second aspect of performance that will be studied. The concept of economic efficiency has two applications within the study of economic theory, those of productive efficiency and allocative efficiency.

Productive efficiency can be narrowly defined in terms of the output of a productive process in relation to its various inputs. In the case of electricity distribution, measurable inputs include bulk supplies of electricity, equipment, materials, capital and labour. Each of these inputs can be quantified and expressed as a cost of the production process. The cost of these inputs may change relative to each other, either as a result of cost saving interventions by the distribution authority, or as a result of external events beyond the control of the distribution authority. The key measurable outputs of the process of distributing electricity are the quantity of electricity sold and the number of consumers served. The productive efficiency of different distribution authorities can be compared by considering the value of their inputs and outputs.

It is possible to develop a wide range of quantitative measurements in order to compare the productive efficiency of different electricity distribution authorities. The most commonly encountered measure in the literature on electricity supply is the ratio of consumers per distribution authority employee. A higher number of consumers per employee indicates higher productive efficiency. Munasinghe (1989:103) points out that about two thirds of electricity utilities in developing countries compared in a World Bank study have fewer than 100 connections per employee. Only 10% had more than 150 consumers per employee. In a review of electrification programmes in six countries, both developed and developing,

Dingley (1988:13) found ratios ranging from 89 to 293. It should be pointed out that the ratios of different distribution authorities may differ widely as a result of different operating conditions and different levels of organisational development. For example, distribution authorities which also generate electricity will have more employees than those that only distribute electricity, but serve no more consumers. Nonetheless, an indication of this ratio will be provided for South African distribution authorities where possible.

Where data which spans a number of years on the financial performance of distribution authorities is available, another set of quantitative measures of changes in productive efficiency can be generated. One such measure will be used here. By analyzing the operating accounts of a distribution authority, an averaged rate of change of the cost of labour over a period of time can be obtained. The cost of labour is of course a measure of the total wage packet paid to distribution authority employees. This rate can then be compared to the average rate of growth of the output of the distribution authority. Growth in output can be measured by the growth of the number of consumers served, or by increases in the number of units of electricity sold. Finally, these two measures can be compared. If the rate of output growth is higher than the rate of change in the cost of labour, then productive efficiency is increasing. There may be a number of external and internal reasons for trends of this sort. This indicator is highly technical, and must be interpreted with care, but is especially useful for examining the effects of labour-saving productivity programmes.

Cook and Kirkpatrick (1988) suggest that where quantitative measures of efficiency are not available or are not found to be useful, other, more qualitative measures can be examined. For example, Ammons (1984) notes that in a number of studies carried out in the USA, the presence of budgetary constraints improved municipal productive efficiency. Two types of constraints are mentioned. Firstly, limits may be placed on the rate of growth of operating and capital budgets. Secondly, overspending of approved budgets may be prevented. In the sections which follow, the presence or absence of such constraints upon South African distribution authorities and the resulting effects will be examined.

A second qualitative measure of productive efficiency in enterprises is the quality of their management. The experience and qualifications of existing managers and the existence of incentives to improve managerial performance provide an indirect

measure of enterprise efficiency. South African distribution authorities will also be assessed according to this criteria.

A second application of the concept of economic efficiency in economic theory, that of allocative efficiency, will not be used in this study. Allocative efficiency is observed when optimum use is made of scarce resources, to the maximum benefit of both producers and consumers. In the case of electricity distribution, detailed calculations can be employed to determine tariff structures which approximate this condition. A substantial body of literature exists which focuses on this subject. Two key works are those of Turvey and Anderson (1977) and Munasinghe and Warford (1982). The allocative efficiency (or inefficiency) achieved in electricity pricing by South African distribution authorities will not be examined in this study. That task could not be addressed in a study of this scale.

It should be noted that economic efficiency alone is not an adequate indicator of the performance of a distribution authority. For example, economic efficiency may be "good" whilst the extent and quality of service provided may be poor. A range of indicators of performance need to be seen in relation to each other.

The third and final indicator of performance that will be used here is that of effectiveness. Effectiveness will be understood here as the extent to which an enterprise achieves the goals for which it was established. In the ideal case, the goal of an electricity distribution authority is to provide a reliable and affordable electrical service to all potential users within its area of supply. This may not possible due to a number of problems, such as shortages of capital or labour, or the poverty of potential consumers.

In attempting to bring electricity to all, including the very poor, the financial performance of a distribution authority might suffer. Subsidisation of capital or operating expenditure by the state may be required. As is noted by many authors, notably Munasinghe (1990), it is questionable whether the subsidisation of service provision is the most sensible means of assisting the poor. Nonetheless, as Cook and Kirkpatrick (1988) argue, it is seldom possible in developing countries to deal effectively with problems of poverty by more direct means such as income support, unemployment insurance or social pensions. As a result these goals may be pursued in the provision of electricity. Full electrification may

therefore be pursued at the expense of "good" financial performance. Once again, effectiveness is only one indicator of the performance of distribution authorities, and must be read in conjunction with other indicators. The effectiveness of the six types of electricity distribution authorities in urban areas of South Africa will be assessed by comparing the levels of electrification achieved in their areas of supply, and the quality of the service that they provide.

After the description and assessment of all six distribution authority types, three case studies are presented to further illustrate these issues of performance. These are of the City of Cape Town Electricity Department, the Lingelethu West City Council Electrical Department, and of Kwanolec (Pty) Ltd.

The chapter ends with a brief conclusion, which draws together the major observations made in the course of the preceding sections.

2.2 The Evolution of the South African Electricity Supply Industry

The intention of this section is to describe the evolution of the South African ESI in order to show how the institutions responsible for electricity distribution have changed over time.

South Africa was one of the first countries to use electricity on a commercial basis. Kimberley, then a thriving mining town, had electric street lights in 1882. The distribution of electricity to the streets and homes of a small number of wealthy residents in urban areas of South Africa began under the auspices of various municipalities. Kimberley's first distribution system was installed in 1890, followed by Johannesburg in 1891, Pretoria in 1892, Cape Town in 1895, Durban in 1897 and Port Elizabeth in 1906. In most cases these municipalities owned and operated their own generating stations. The Association of Municipal Electricity Undertakings (AMEU), a non-statutory organisation of city electrical engineers which represents municipal electricity departments, was founded in 1915.

Electricity was not initially used extensively for domestic consumption. The

primary reason for the rapid growth of electricity generation and distribution in South Africa was its consumption by large industrial users. An account of the early history of electricity use in South Africa is provided by Christie (1984). In the 1890's mining companies combined to erect power stations to supply their own needs. In many cases access to electricity allowed formerly labour-intensive tasks to be carried out by electrically powered machines. A number of privately owned electricity suppliers were established at this time. The most powerful of these, the Victoria Falls and Transvaal Power Company Limited, was formed in 1906 to harness the hydro-electric potential of the Victoria Falls in Zimbabwe (then Rhodesia) and to supply electricity mainly to mines and industries on the Witwatersrand. The plans to utilise the Victoria Falls to generate power soon fell by the wayside, but the generation of electricity from coal continued on the Reef.

The Electricity Supply Commission (now Eskom) was established in terms of the Electricity Act of 1922. Eskom is an independent public corporation charged with the responsibility of providing electricity in South Africa. It is an autonomous enterprise, independent, in most respects, of the state. The Electricity Council, Eskom's controlling board, have full control over the financial management of the organisation. According to the Electricity Act, which has been updated a number of times since 1922, the state treasury was also empowered to guarantee the stocks and bonds issued by Eskom on local and foreign capital markets.

Eskom took over the VFTPC in 1948, and became increasingly dominant in the generation and transmission of electricity in South Africa. Generation by municipalities also dwindled with the development in 1973 of the national grid, which linked all major cities in the country to a number of very large and efficient power stations. After 1980, the combined effect of a slump in the economic growth rate of the country and over ambitious demand forecasting resulted in Eskom having a very substantial generating over-capacity. As a result, Eskom has entered into special agreements with bulk users to encourage them to not generate their own power. Eskom presently generates 97% of the electricity used in South Africa. Eskom has grown to be one of the ten largest electric utilities in the world, generating more than half of the electricity used in the entire continent of Africa (Eskom,1990a:1).

The distribution sector of the ESI has evolved differently and does not display the same level of institutional integration. From the 1880's through to the present

day, white municipal supply authorities have distributed electricity to industries and businesses within their municipal areas, to street lighting systems and to domestic consumers. The sole right of municipalities to do so was confirmed by the 1922 Electricity Act, and by all of its subsequent revisions. As a result, electricity distribution, which began in the isolated cities and towns of the 19th century, has remained fragmented right to the present. Prior to 1948, private companies such as the VFTPC distributed electricity to mines and to larger industrial users in some parts of the country. This role has since been taken over by Eskom. This situation has continued through to the present day and Eskom still supplies electricity directly to mines and some larger industrial users.

The policies of racial segregation and "separate development" pursued by successive white minority governments in South Africa have also contributed to the fragmentation of the distribution sector of the ESI. The formation of "homeland" states (some of them notionally independent, others supposedly self-governing), and segregated local authorities to serve racially defined groups in urban areas of the rest of South Africa gave rise to a range of separate, generally very weak, distribution authorities.

The existing range of distribution authorities in South Africa are described in the rest of this chapter.

2.3 White Municipal Electricity Departments

As noted, white municipalities are currently granted the sole right to distribute electricity within their areas of jurisdiction by the Electricity Act (41 of 1987). By the middle of 1989 there were more than 520 white municipalities in the whole of South Africa (Thornhill,1989:40).

Municipal government for white South Africans has been provided for by South African constitutional law since 1836, when the first Municipal Ordinance of the Cape Colony came into force (Cloete,1988:238). The present dispensation is described by the Provincial Government Act (Act 32 of 1961). In each province, provincial ordinances exist which legislate the duties, powers and responsibilities of white municipalities. Since the establishment of the tricameral parliament in

1984, the system of co-ordination of white local authorities has become more complicated. According to the constitution, this function is a white "own affair" and is the responsibility of the Department of Local Government, Housing and Works in the Administration: House of Assembly. In reality this task is still carried out by the provincial authorities. At a higher level, the development of local government affairs on a national basis is the responsibility of the Department of Planning and Provincial Affairs.

All but the smallest white municipalities have separate electricity departments which operate and maintain their own electrical networks. The financial administration of the electricity service is commonly provided by the city or town treasurer's department. In some respects the autonomy of electricity departments within white municipalities is limited. For example, the budgeting process is tightly controlled by the municipal council. Also, the staff of electricity departments are usually remunerated according to pay scales set by the Town Clerk's Act, and by the municipal council. In other respects, such as in decisions about technical standards of electricity systems, the managers of electricity departments have wide policy making discretion. As a result of these factors, one may describe white municipal electricity departments as semi-autonomous, publicly owned enterprises.

White municipal electricity departments are large and powerful organisations within the ESI. As was shown on Tables 1 and 2, they provide electricity to 80.1% of all consumers served in South Africa. They serve approximately 2 million consumers, of which about 1.7 million are domestic users. They were responsible for 44.8% of electrical energy distributed to all industrial and commercial users; 85.3% of electricity distributed to all domestic users; and 37.8% of electricity distributed to all types of end users in South Africa (Eskom,1990b). The four biggest white municipal electricity departments (Durban, Johannesburg, Pretoria and Cape Town) consumed 21 768 GWh of electricity, 16.2% of Eskom's total sales in 1989 (Eskom,1990b).

Almost all of the electricity sold by white municipalities is bought in bulk from Eskom. Although the larger municipalities have their own generating capacity, very few of these power stations are operated, since Eskom offers rebates to these municipalities for keeping them shut down. According to this scheme, known as "capacity allocation", the demand charge levied on a municipality per month is

reduced by the potential output of any unused generating capacity.

In 1989, 86.7% of the consumers of white municipal electricity departments were domestic users. A further 9.2% of consumers were industrial and commercial users. The remaining 4.1% of users were undefined. In energy terms, domestic users used 33.2% of the electricity distributed by white municipalities in 1989. Industry and commerce used a further 58.3%. The remaining 8.5% was used by undefined users (Eskom,1990b).

The residential areas which are served by these electricity departments include virtually all white group areas, as well as some coloured and Indian group areas. Separate supply authorities do not exist for the supply of electricity to people living in coloured and Indian group areas. Legislation was established in the four provinces to provide for separate local authorities for coloured and Indian areas. As a result of political opposition from coloured and Indian communities only one coloured area, Pacaltsdorp (near George), has an independent local authority (Thornhill,1989:40). In most cases, white municipalities provide services to these areas. In a few other areas, especially in the Western Cape, coloured communities have been provided with services by Regional Services Councils.

In a limited number of cases around the country, white municipalities provide electricity in black townships. For example, the City of Cape Town electricity department provides electricity to the townships of Langa and Gugulethu, which fall within the area of jurisdiction of the Ikapa Town Council, a black local authority. In other cases, a white municipality may provide staff to operate and maintain a BLA's electricity system on an agency basis. This is the case, for example, in the townships around Bloemfontein.

Financial Performance

In order to assess the financial performance of white municipal electricity departments it is necessary to briefly describe the financial systems, as prescribed by provincial ordinances, within which they operate. White municipalities are almost entirely financially self-sufficient and receive only small subsidies from central and provincial government for the operation of certain services.

The financial strength of white municipalities varies widely. Municipalities in the large metropolitan centres have annual budgets of thousands of millions of rands. They provide a high level of services to the residents and commercial and industrial sites within their areas of jurisdiction. The basic infrastructure systems that they operate have long been established. The rate of population growth within their municipal boundaries is generally relatively slow, in comparison to the fledgling municipalities which surround them. As a result, capital expenditure by these municipalities is primarily for the incremental expansion of existing systems and the replacement of old equipment, rather than for large new infrastructure development. Smaller and younger white municipalities are generally worse off, since capital expenditure on new infrastructure systems is high.

The general decline in economic conditions in the 1980's described in chapter one has also affected white municipalities. Many are currently battling to contain municipal expenditure as a result of high inflation, growth in demand for services, decay of existing infrastructural systems, and public resistance to rate increases.

The first major source of municipal income is rates on immovable property (known as assessment rates). Rates are payable by land-owners, home-owners and the owners of business premises. They are calculated on the basis of municipal valuations of property. The amount payable to most municipalities on each rand of property owned has increased slowly over time, generally in line with the rate of inflation. However, the overall contribution of rates to municipal revenues has generally declined, since most budgets have grown faster than the rate of inflation. It is often argued in municipal circles that rates should not be increased, since ratepayers have no way of reducing or avoiding this form of taxation. It is also true that ratepayers are usually a powerful and vocal sector of the population within municipal areas. As a result, elected councillors have traditionally been wary of raising rate levies.

The other major source of municipal income is revenue from the provision of trading services. Trading services are those for which a charge is levied, such as electricity, water and public transport. In some towns and cities, such as Pretoria, refuse removal, sewerage and other minor services are also charged for on a monthly basis. Subject to conditions set out in provincial ordinances, the tariffs

charged for these services may be amended by resolution of municipal councils. In most cases the permission of the provincial Administrator is required, and is provided almost as a formality (Scholtz,1990; Mickeleit,1990). Given the need to increase municipal revenues, it has become commonplace for municipalities to set tariffs at levels which ensure that the revenue generated in the provision of trading services exceeds the costs incurred. Net surpluses are generated which relieve upward pressure on rates and can be used to balance municipal budgets.

White municipal electricity departments are therefore generally profitable and transfer annual surpluses to general municipal accounts. Statistics provided in the 1989 Official South African Municipal Yearbook for 158 white municipalities indicates that only two, Estcourt and Bethlehem, registered deficits on the trading of electricity in the 1988 financial year. The City Council of Pretoria budgeted for a 26% surplus on trading of electricity in the 1990/91 financial year: a transfer of R125 million to the general rates fund. The total expected revenue of the electricity department in the same period was expected to be R480 million (City Council of Pretoria,1990:35). In addition to these amounts, many municipalities do not charge themselves for the electricity which they consume, resulting in a further effective surplus transfer.

A number of government commissions have investigated the practice of generating surpluses through the sale of trading services. The most important of these was the Committee of Inquiry into the Finances of Local Authorities in South Africa (the Browne Committee) in 1980. The committee was chaired by the Secretary for Finance, Dr G W G Browne. It recommended that surpluses on all trading services be restricted to 10% for five years and thereafter be restricted to a maximum of 5% (South Africa,1980:103). The publication of the committee's report led to a storm of protest from white municipalities. As a result, a new committee was set up to re-examine the recommendations made in the report. The report of this second committee, chaired by the Chief of Public Finance, G P Croeser, was submitted two years later in 1982. The Croeser Working Group overturned the recommendation on trading service pricing, stating only that surpluses be restricted "as far as possible" to 10%, but doing away with the recommendation that the restrictions be tightened over time (South Africa,1982:51). As can be seen from the statistics provided above, this recommendation is not strictly applied.

As was pointed out in the introduction to this chapter, another indicator of the financial performance of distribution authorities was the extent of their indebtedness, and their ability to sustain repayments on external debts. In this respect, the performance of most white municipalities is good. The annual capital expenditure of large electricity departments is high, as is the annual operating expenditure they devote to servicing their loan commitments. For example, the City of Cape Town electricity department budgeted for capital expenditure of R57.1 million in the 1990/91 financial year, while it spent R44.7 million - 14.2% of total operating expenditure - in the 1988/89 financial year on capital charges arising from debt (Cape Town,1990a:39; Cape Town,1990b:19). Debt repayments of this magnitude are sustainable because white municipalities operate a mature system, with a well-established consumer base. As a result of their ability to service loans, white municipalities also have easy access to capital at relatively low interest rates. The sources of loan capital available to white municipalities are described in chapter four.

In conclusion then, the financial performance of white municipal electricity departments is good. Most are very profitable, and generate surpluses which are transferred to general municipal funds. They are also not excessively indebted, given their ability to adequately meet their loan commitments.

Economic Efficiency

As noted in the introduction to this chapter, economic efficiency can be defined in terms of a number of quantitative measures. The first measure is the ratio of consumers to departmental employees. The statistical information on electricity provision by white municipalities is not comprehensive and these figures are therefore difficult to generate. The City of Cape Town electricity department, for which data is available, had a ratio of 92.1 consumers for each employee in 1989 (Cape Town,1990a:39). This ratio improved from 1985 when there were only 83.8 consumers for each employee. This improvement may be largely due to staff reductions at the department's Athlone power station which has not been operative since 1987. Given its size and its relatively well-developed organisational structure, the Cape Town electricity department is probably more efficient than most distribution authorities in South Africa. However, according to the World Bank study reported by Munasinghe (1989:103), ratios lower than

100 are common in developing countries, and are considered to be poor by developed country standards. Thus, whilst efficiency has improved marginally in recent years according to this measure, it is low by international standards.

A second quantitative measure was mentioned in the introduction to this chapter which indicated changes in productive efficiency. This measure is obtained by comparing the rate at which the cost of labour changes to the rate at which labour output changes. In order to increase output per unit of labour, many municipal electricity departments have tried to reduce the relative levels of staff wages and salaries within departmental operating budgets. Most of the larger municipalities have applied a policy of freezing and scrapping vacant posts, resulting in a slow decline in the total numbers of municipal employees. The effects of such policies may however be offset by wage and salary increases for the remaining staff. This appears to have been the case with the City of Cape Town electricity department where the percentage of operating budget devoted to staff costs rose from 14.4% in the 1984/85 year, to 16.8% in the 1988/89 year despite a falling total staff complement. Over the same period the absolute amount spent on wages and salaries rose from R27.4 million to R52.9 million, an increase on average of 18.6% per year. The expenditure on wages and salaries per employee (the average wage) rose from R10 544 to R20 714, an average increase of 19.3% per year. On the other hand, the revenue earned by the department per employee over the period rose by an average of only 14.4% per year. Thus, assuming an inflation rate of 13% over the period, real labour costs per employee rose by 6.3%, while output per employee rose by only 1.4%. The amount of electricity sold per employee increased by an average of only 3.6% per year (Cape Town,1990a:39). As a result of these trends, the cost of labour increased faster than the increase in output per unit of labour, in both cost and energy terms. As a result, the average productivity of labour decreased over the period according to these measures.

Apart from these quantitative measures, two qualitative measures of economic efficiency were mentioned in the introduction to this chapter. The first was the existence and effect of any budgetary constraints faced by electricity departments. Prior to the early 1980's, few such budgetary constraints existed and no coherent control was exercised over growth in annual municipal operating expenditures. After the conclusion of the work of the Croeser Committee in 1982, control over municipal expenditure was taken over from the provincial Administrators by the Department of Finance (South Africa,1982). The department has since imposed

limits on the annual growth of operating expenditure of white municipalities. In keeping with the commitment to reducing government expenditure at every level, these limits have been set at or below the expected rates of inflation. Increases in excess of the limit must be cleared with the Department. The limit for the 1990/91 financial year was 13%, while the inflation rate over that year was approximately 14% (Cape Town,1990b:7).

As a result of these constraints, white municipalities appear to have attempted to increase productive efficiency in order to cut costs. After the submission of the Browne and Croeser reports in the early 1980s a shake-up in municipal administrations was ordered. The reports submitted by both committees recommended ways of improving the performance of white municipalities. The recommendations focused on the improvement of the quality of ongoing financial management; the reappraisal and re-organisation of existing organisational units; the improvement of financial information systems, cost control systems, budgeting systems and inventory management systems; and the improvement of labour productivity.

A study of the budget policy statements of two large metropolitan municipalities, Cape Town and Pretoria, indicates that a great deal of emphasis is placed on the need to improve efficiency. The fact that municipal budgets are constrained is continually referred to, as are calls for departments to be more efficient and cost conscious. In particular, the constraints introduced by the Department of Finance cause very great pressure on individual departments to reduce their budget requests.

In practice, the effects of budgetary constraints at municipal level may not be felt as severely by electricity departments as by other departments. For example, whilst the operating budget of the City of Cape Town increased by 13.0% between the 1989/90 and the 1990/91 financial years, the operating budget of the electricity department increased by 17.7% (Cape Town,1990a:39; Cape Town,1990b:21). Also, it is unclear whether the effect of pressures to reduce budgetary growth has been primarily to improve efficiency, rather than to reduce the quality of service provided, or to reduce rates of system expansion.

The second qualitative measure of economic efficiency mentioned as being worthy of closer examination was the quality of management in electricity departments.

The fact that the functions of electricity provision are split between the electricity department and the city treasury may hamper the effective management, and therefore the efficiency, of the service. Within the electricity department financial administration, planning and control tend to receive less attention than technical and engineering issues. Likewise, accountants in the treasurer's department are primarily concerned with financial issues without necessarily having an adequate feel for the technical aspects of electrical engineering (Malan,1990; Botes,1989). The senior management of white municipal electricity departments are usually experienced and well qualified electrical engineers. However, shortages of properly qualified managers is cited as a major problem for almost all white municipal electricity departments (Botes,1989). This problem has arisen as a result of a number of factors. Firstly, there is a general shortage of engineering graduates in South Africa. According to one estimate, South Africa produces 40 engineering graduates (all disciplines) per year per million of population, compared with 280 for Western Europe and 320 for the USA (Grant,1990:9). The problem is not expected to be resolved in the short term, since the intake of engineering schools in the country is constrained by weaknesses in the systems of primary and secondary education in the country.

A second reason for the shortage of employable managers is the fact that municipal service is not seen by many graduates as an attractive employment option. According to a number of people consulted in the course of carrying out this study, recently qualified graduates are attracted to employment in the private sector by higher salaries. To a certain extent, the fact that electricity departments are constrained by municipally determined salary scales contributes to this problem. In addition, a perception exists that private sector employment offers a more stimulating work environment and the possibility of faster advancement. Probably for the same reason that many members of the public regard the public sector as inefficient and bureaucratic (a perception not always based on sound information), employment in the public sector is not viewed as having sufficient status. A number of municipal employees consulted also noted that managers in municipal electricity departments are constrained by bureaucratic work procedures. As a result of these problems, there is commonly a gap in the middle management levels in most electricity departments. Johannesburg's electricity department for example has only 50% of its establishment of engineers (Grant,1990:7). The turnover of young engineers in some departments is also very high (Cape Town,1990a:2).

In conclusion then, the economic efficiency of white municipal electricity departments is probably not significantly better or significantly worse than that of other large public sector enterprises. According to quantitative measures, one of the largest and best developed electricity departments in the country, that of the City of Cape Town, has a below average (by international standards) score on a measure of productive efficiency. Whilst attempts have been made to improve efficiency over the past decade, output per unit of labour has increased only marginally by some measures and has decreased according to others. Borrowing an analogy from Ammons (1984), electricity department efficiency can be said to be rather like the Loch Ness monster. A number of sightings have been reported, but nothing conclusive has yet been proven. Judging from more qualitative assessments, it would appear that a number of problems that commonly hamper efficiency improvement programmes in public sector institutions also affect white municipal electricity departments. Particularly important in this regard is their inability to provide satisfactory incentives to skilled younger personnel, and their consequent failure to retain staff with managerial potential.

Effectiveness

The effectiveness of electricity distribution authorities was defined in the introduction to this chapter as the extent to which they approach the ideal of providing reliable and affordable electricity to all households within their areas of supply. According to this definition, white municipal electricity departments have been relatively effective. Within their areas of supply almost all homes, businesses and other sites are electrified. Predictably, the areas of supply of white municipal electricity departments are those areas of South Africa which are economically well developed. The availability of cheap and abundant electrical energy has contributed to this development. The service provided in these areas is widely considered to be affordable. Also, the standard of the service is generally considered to be satisfactory. In the few cases where white municipal electricity departments serve black residential areas payment defaulting and service problems tend to be experienced. Information on the extent of these problems is however not widely available.

For most white municipalities, the provision of electricity is a relatively stable, uncomplicated and profitable business. The annual reports of municipal

electricity departments show rising sales, increasing revenues and numbers of consumers. No mention is made of the fact that the electrification of black townships adjacent to their areas of supply has not progressed at all. In this broader sense, white municipal electricity departments have been effective precisely because they have been insulated from the areas where the greatest need exists for effective provision of electricity, and where less profitable results are likely to be experienced. The question of electricity provision in black townships will be considered in the next section.

2.4 Black Local Authority Electricity Departments

According to the Electricity Act (41 of 1987), Black Local Authorities (BLAs) have the sole right to distribute electricity within their areas of jurisdiction. In 1989 there were 260 BLAs around the country (Thornhill,1989:40). Legally speaking, BLAs are fully autonomous local government structures, and have the responsibility of providing services to township residents on an independent basis. They were created in 1982 with the promulgation of the Black Local Authorities Act (Act 102 of 1982). Prior to that time the control of black urban townships had been the task of regional Administration Boards. These Boards provided very few services to their areas of jurisdiction.

Currently, each of the provincial administrations has a department which is responsible for overseeing the affairs of BLAs. In addition, the Department of Provincial Affairs and Planning is responsible for the development of local government affairs on a national basis.

BLAs have had a troubled history. Most have been beset by crises since their creation. They have obtained very low electoral support. In the local government elections held on 26 October 1988, the average poll in BLA elections was 25.1% (Heunis,1989:32). According to figures released by the Transvaal Provincial Administration in January 1991, 42% of all BLAs in South Africa had collapsed (New Nation,1991). In most cases this was due to resignations by BLA councillors, largely because of pressure from township residents. The financial problems experienced by BLAs have also been severe. These problems will be examined in more detail in the next section.

The better developed BLAs operate their own electricity service, often along similar lines to white municipalities. Most establish fully-fledged electricity departments. These departments might also be described as semi-autonomous publicly owned enterprises. An example of this sort of arrangement is the Lingelethu West Electrical Department which provides electricity to the township of Khayelitsha, outside Cape Town.

A number of other BLAs are administratively weak and contract out the provision of electricity to other local government structures or to Eskom. In some cases the BLA retains ownership of the electricity network, and pays a fee to an agent for the operation and maintenance of the network. An example of this sort of arrangement is where the Bloemfontein electricity department provides these services to the BLAs set up to serve the townships around the city. In other, more limited cases, the BLA cedes the supply of electricity entirely. An example of this sort of arrangement is where the City of Cape Town electricity department owns the electricity networks and serves the townships of Langa and Gugulethu which fall within the area of jurisdiction of the Ikapa Town Council. The Eskom 1989 statistical yearbook lists only 35 BLA distribution authorities (Eskom,1990b). Since there are certainly more than this number of BLA electricity departments in existence, this may be due to the time delay in collecting and publishing statistical information, and the generally poor reliability of statistics on BLAs.

As shown on Tables 1 and 2 these 35 BLAs electricity departments served 207 521 consumers and distributed 1 740 GWh of electricity in the 1988/89 financial year. This represented only 8.4% of all consumers served in the country, and only 1.3% of all electrical energy distributed. 125 000 consumers in Greater Soweto alone consumed 948 GWh in the course of that year (Eskom,1990b).

Most black townships have very few industrial or commercial sites. This is reflected in the fact that only 2.0% of electricity distributed by BLAs is used by industrial or commercial consumers (the same percentage for white municipal electricity departments was 58.3%). BLA electricity systems therefore have less smooth demand patterns and poorer load factors. Poor system load factors result in higher demand charges relative to the amount of electricity consumed. As a result, BLAs pay more per unit for bulk electricity supplies than white electricity departments.

BLAs buy electricity in bulk either from Eskom or from a nearby white municipal electricity department. The Black Local Authorities Act (Act 102 of 1982) specifies that where electricity is sold in bulk by another local authority to a BLA, the electricity should be provided "at cost". The implications of this specification are the subject of some controversy. White municipalities generally charge nearby black local authorities their standard industrial user tariff, less a small discount. For example, Port Elizabeth electricity department is the bulk supplier to the BLA serving the township of Motherwell. The BLA pays standard industrial rates, less a discount of 2,5% (Adams and Gwilt,1990). This is a controversial policy, since white municipalities generally set electricity tariffs at levels which ensure that surpluses on trading of at least 10% are generated. In some cases then, the residents of black townships are helping to relieve upward pressure on rates payable by ratepayers in white towns.

Financial Performance

In order to assess the financial performance of BLA electricity departments it is necessary to briefly describe the financial system within which BLAs operate, as prescribed by the Black Local Authorities Act. Like white municipalities, BLAs have the right to collect monies from rents on local authority owned housing, rates on land and from the sale of trading services. As with white municipalities, no special provision was made in the Act for the regular transfer of funds from provincial or central levels of government to subsidise their operation. BLAs have experienced severe financial problems for reasons that are listed below.

i. The areas served by BLAs are economically and infrastructurally underdeveloped. This is largely because of the failure of the government to devote sufficient funds to the development of these areas prior to the 1980's. As a result, enormous backlogs exist in spending on infrastructural development in these areas.

ii. At the time of their creation, it was envisaged that BLAs would become fully autonomous local government structures, within the apartheid framework of racially segregated residential areas. The areas of jurisdiction of BLAs were therefore determined by racial considerations, rather than sound economic or financial considerations.

Many do not include industrial areas or rateable properties. Unlike white municipalities, BLAs do not have a mature system of levying and collecting property rates. The systems of site rent devised by some BLAs are viewed by residents with distrust (van Zyl,1989:34). As a result of their very limited tax base, BLAs depend heavily on service charges levied on a monthly basis.

iii. The system of BLA finances was designed to exclude the subsidization of township development by the central government. Instead, development loans were issued to BLAs which had to be repaid by means of the collection of contributions from township residents. Services were thus to be provided on a cost-recovery basis. Given that most township residents are relatively poor, it was soon discovered that tariffs set at cost-recovery levels were beyond the ability of many township residents to pay. Also, public opposition to tariff increases prevents some BLAs from making annual tariff adjustments in line with inflation. In some cases in the Transvaal, tariffs for services were not increased at all between 1984 and 1989 (van Zyl,1989:34). As a result of these problems, many township residents fell into arrears on rent and service charge payments. In turn, BLAs usually budget for deficits on the trading of electricity. Even then, many BLAs fail to meet budgeted revenue targets.

iv. The demands for new services in areas served by BLAs are continually rising. Rapid rates of urban population growth and of rural to urban migration mean that new spending needs have far outstripped the resources available to BLAs.

v. The generally poor standard of services provided, poor administration of accounting systems, and the failure of authorities to be responsive to resident's complaints have made many residents unwilling to pay rents and service charges.

vi. BLAs are considered by many township residents to be politically unacceptable structures, since they operate within the system of apartheid government. As a result, many refuse on political grounds to pay rents for local authority housing and for services.

As a result of these constraints, BLAs have never been grown towards financial self-sufficiency, as their creators had hoped they would. Over the 1980's government planners developed two main strategies in attempting to deal with this problem. Firstly, the system of providing bridging finance to BLAs was instituted. Within this system, BLAs were allowed to budget for small deficits, and to apply to the provincial authorities for relief when they had cash-flow problems, such as when they need to pay their staff, or their bulk suppliers. Secondly, Regional Services Councils were created in 1985 to transfer funds collected on a regional level to black areas for the purposes of capital spending on infrastructural development.

Both of these strategies have had limited success. In recent years, each of the Provincial Administrations have set aside large amounts each year for the payment of bridging finances. It is extremely difficult to determine accurately the amounts paid out by the provincial authorities, since this information is contained within a number of separate provincial documents. In the Cape Province, where bridging finance is regarded as a grant, the amount spent between 1986 and 1990 was at least R500 million (Cape of Good Hope,1990:79). In the Transvaal and in the Orange Free State, bridging finance issued is regarded as a loan, to be repaid by the BLA at zero interest. Not surprisingly, BLAs have been unable to make any repayments on these loans. The accumulated amounts paid out in bridging finance to BLAs in the Transvaal alone by August 1990, was at least R1.7 billion. Largely because of over-expenditure on bridging finance, the budgets of the Transvaal Provincial Administration have for a number of years been exceeded. As a result, the total state deficit has increased (Province of Transvaal,1990:6).

At the end of August 1990, the system of providing bridging finances to BLAs began to break down. At that time the total amount budgeted for provision to BLAs as bridging finance by the Transvaal Provincial Administration (TPA) was depleted, well before the end of the financial year. The TPA declared a moratorium on the payment of bridging finance. The provincial authorities in the Orange Free State soon followed suit. In the ensuing crisis BLA accounts for the bulk supply of electricity and water were not paid. In a number of cases white municipal bulk suppliers responded by disconnecting the supply. In a few areas, negotiations between provincial authorities, delegations of township residents and suppliers resulted in new agreements on the organisation of BLA finances. Also, in a number of regions RSC funds, previously intended for capital projects, have

been spent to cover BLA budget deficits. At the time of writing, no permanent solution to the financial problems of service provision in black townships had been found.

Given this general description of the state of the system of BLA finances, it is clear that the financial performance of BLA electricity departments has been poor. In most cases the provision of electricity by BLAs has resulted in them suffering substantial losses.

Even in townships where conventional credit electricity metering systems are used, most residents are deeply in arrears. This has created huge financial problems for BLAs. The purchase and sale of electricity is often the largest component of a BLA's total income and expenditure. In the case of the City Council of Soweto (one of three BLAs in the Greater Soweto area), electricity trading in 1989 accounted for about 60% of both projected income and projected expenditure on council budgets. Unfortunately, while expenditure on bulk purchases of electricity from Eskom continued, the payment rate for electricity during the period was only around 20%. Substantial losses resulted from the provision of electricity (Du Toit,1989:47).

In townships where prepayment meters are used, and it is therefore impossible for residents to be in arrears, it is often not known whether the provision of electricity results in a net surplus or a net deficit. This situation arises because separate accounts for the different trading services are not maintained. The Black Local Authorities Act states only that a general revenue account must be maintained, into which all monies which accrue to the local authority must be deposited and from which all expenses must be paid. In some cases the maintenance of accounts is so haphazard that it is not possible to determine even if the sale of electricity through prepayment meter control points is providing sufficient revenue to cover the expenses incurred in the supply of electricity (Loots,1990).

As was pointed out in the introduction to this chapter, another useful indicator of the financial performance of an electricity distribution authority is the extent of its indebtedness, and its ability to sustain repayments on external debts. In this respect the performance of BLA electricity departments, given the financial system that they operate within, has predictably been very poor. Consistent with the

financial system explained above, loans provided by state-supported development funds are used for the infrastructural development of black townships. These loans are supposed to be repaid by BLAs from revenues collected from residents. As a result of the financial crisis of BLA, most have been unable to pay their staff, let alone service their debt commitments. As a result, many of these loans are simply accumulating as missed interest payments are capitalised.

As a result of their excessive indebtedness, BLAs are now generally unable to raise capital from external sources. They are unable to finance the extension of electricity networks to new areas. For example, because of its poor record of servicing loans, the Lingelethu West City Council has been unable to raise R16 million needed for the electrification of Khayelitsha Town 1 (Village 1 and 2), even though the project itself could be very profitable (Loots,1991).

In conclusion then, the financial performance of BLA electricity departments has in most cases been very poor. The provision of electricity to many black townships has been the source of major losses. These losses have until recently been covered by bridging finance by the provincial authorities. Most BLAs are excessively indebted as a result of the way in which infrastructural development in black townships is supposed to be carried out on a cost-recovery basis. The financial system within which BLAs operate is in need of thorough revision.

Economic Efficiency

As noted in the introduction to this chapter, economic efficiency can be measured by quantitative means, if adequate data on a distribution authority is available. Very little reliable information has been collected about electricity provision by BLAs. Whilst the 1989 Eskom Statistical Yearbook lists the number of consumers served and total energy distributed by a few BLAs, no details of their staff strength is available. Nor is data on their budgets available from any published source. Given the serious administrative and financial problems most BLAs face, this is perhaps to be expected. The accounting systems in place in most BLAs are unsatisfactory. The report of the Auditor-General (who audits BLA books) for the 1988/89 financial year states the following. "There is an alarming failure to comply with the statutory requirements [in the keeping of accounts]. In many cases the books and accounts for several years prior to the financial year 1988/89

have not yet been finalised" (South Africa,1989a:27).

As a result of this lack of information, it is not possible to provide an indication of efficiency by quantitative measures such as consumers per employee or rate of change of staff costs against the rate of change of output. The one BLA on which information was collected in the course of this study, the Lingelethu West Town Council (also the subject of a case study later in this chapter), had a consumer to employee ratio of 117.7. On face value, this suggests that the Lingelethu West electricity department was more efficient according to this measure than the City of Cape Town electricity department (which had a ratio of 92.1). On closer examination, it appears that the higher ratio is possible since Lingelethu West is not responsible for the development of new systems, only their operation and maintenance. The staff of the provincial authorities and the employees of design consultants and system construction contractors, who are all involved in the electrification of new areas in Khayelitsha, should also be included in these calculations if an appropriate comparison is to be made. That calculation would be difficult to carry out, but would certainly result in a lower ratio.

In the absence of useful quantitative measures, qualitative indicators of economic efficiency will be examined. As noted in the introduction to this chapter, one such measure is the existence of budgetary constraints, such as the limitation of annual growth in operating expenditure, or the prevention of overspending budgeted amounts. These constraints may lead to improvements in economic efficiency (although there is no certainty that this will be the case). Conversely, the absence of budgetary constraints may lead an enterprise to be inefficient. The state of the finances of most BLAs was described above. Largely as a result of the failure to provide BLAs with a structured source of income from the central state (rather than the ad-hoc system of bridging finance transfers) the budgeting process within many BLAs is invalidated. Since payments for rent and services by residents have not usually been forthcoming, or have fluctuated month by month, annual revenue is usually less than expected. As a result, bridging finance is requested from the provincial authorities to pay creditors and staff costs. The budgeting process is obviously undermined, since a major budget item varies due to circumstances beyond the direct control of the BLA. Whilst it does not necessarily follow from these observations that the productive efficiency of BLA electricity departments is poor, it is true that the lack of proper financial targets undermines cost consciousness amongst staff. Ammons (1984) argues that proper

budgeting and accounting procedures are necessary if productive efficiency in local authorities is to be improved. Without realistic financial targets and the flow of financial information, financial discipline is likely to degenerate. If over-expenditure of approved budgets is repeatedly tolerated, little incentive remains to improve productivity, to cut costs or to adhere to any targets at all. In situations where financial control is lacking corruption is also very much harder to check. In the case of the Lekoa and Soweto BLAs, the Administrator of the Transvaal intervened in 1990 to investigate allegations of corruption (RSA Policy Review,1991:30)

The second qualitative measure of economic efficiency mentioned was that of managerial performance. The ability of BLA electricity departments to attract qualified managers is very limited. As a result of the duplication of local authority structures on a racial basis in South Africa, and the general shortage of technically qualified personnel, small, relatively disorganised electricity departments struggle to attract career-oriented engineering staff. The General Machinery Regulations, issued in terms of the Machinery and Operational Safety Act (Act 6 of 1983), specify that a "competent person" must be appointed by the supply authority to supervise the operation of an electrical system. For a system with a maximum demand rating of over 10 MVA, the regulations specify that the competent person must be a graduate engineer with at least two years of post graduate experience in the operation of electrical systems. Most BLAs are unable to employ a suitably qualified Town Electrical Engineer according to this criteria. In such cases, electricity departments are either run under the authority of the Town Engineer (if one is employed) or is run by an under-qualified person, in contravention of the Act (Wyatt,1990).

The present system of determining the remuneration of BLA staff does not provide financial incentives for managers to seek employment with BLAs. The remuneration packages of all local authority staff (including white municipalities) are determined by the so-called "13 factor" grading formula as set out in the Remuneration of Town Clerks Act of 1984. In terms of this system, the grading of a local authority is determined by the total value of the services it renders. The staff of black local authorities (which tend to have low gradings) are therefore invariably paid less than their counterparts in larger local authorities. As a result of this combination of factors managerial performance in most BLAs is not good. This is likely to act as a constraint to improved economic efficiency.

In conclusion then, the efficiency of most BLA electricity departments is probably low. The inability of BLAs to draw up proper budgets results in poor cost consciousness amongst departmental staff. The scarcity of well trained managers also inhibits improvements in efficiency.

Effectiveness

The effectiveness of electricity distribution authorities was defined in the introduction to this chapter as the extent to which they approach the ideal of providing reliable and affordable electricity to all potential users within their areas of supply. At the time of their creation in 1982, it was intended that BLA Electricity Departments should carry out this task. They have clearly failed to do so. The current black urban population in South Africa outside of the "homelands" is about 12.5 million people (The Economist:1990b:2). According to the 1989 Eskom Statistical Yearbook there were approximately 210 000 domestic electricity consumers served by BLAs (Eskom,1990b). This number may be low, given that the statistics on electricity provision in black townships are generally unreliable. Assuming that six people live in each household with electricity, this means that only about 10% of black South Africans in these urban areas have access to electricity.

As a result of the financial crises experienced by BLAs electricity supplies to some existing consumers are being turned off. For similar reasons, very few new connections are being made. Because of the inability of BLAs to repay development loans, new capital for electrification projects has dried up.

It should be noted that the ideal of providing reliable and affordable electricity to all in black townships, including the very poor, would probably require high levels of subsidisation and access to cheap capital. These schemes may only be profitable in the longer term. As noted in the introduction to this chapter, the subsidisation of low-income consumers by wealthier consumers, or by the central state from general tax revenues may be a viable option in such cases. International experience indicates that such subsidies must be carefully targeted at the most needy, in order to avoid wasting scarce public monies (Munasinghe,1990). At the moment, the financial disarray of BLAs prevents arrangements of this sort from being made.

Where Eskom has attempted to press ahead with the electrification of new areas, they have been obstructed by BLAs who have refused to concede their statutory right to supply electricity to their areas of jurisdiction. This opposition is due in part to the fact that the salaries of BLA employees, under the "13 factor" system described above would decrease. In a number of cases, especially where BLAs are weakened as a result of resignations by some councillors, BLA employees are able to stall decisions to cede the right to supply electricity.

Anecdotal information from township residents suggests that the quality of the service provided to existing consumers in most townships is poor. The administrative systems that are supposed to underpin the provision of electricity are not operating effectively.

Institutional and financial problems are therefore the key obstacles to the effective provision of electricity to black urban areas in South Africa. These problems stem largely from the unsatisfactory political and financial system of racially segregated local government. It would appear that the integration of electricity distribution authorities in South Africa is necessary if the effective provision of electricity to all urban areas is to be achieved. This issue will be examined in greater detail in later chapters.

2.5 Regional Services Council Electricity Departments

According to the Electricity Act (41 of 1987), Regional Services Councils (RSCs) may buy and sell electricity within the areas of jurisdiction of all local authorities, and in other areas with the permission of the Electricity Control Board.

RSCs were created in July 1985 with the promulgation of the Regional Services Councils Act (Act 109 of 1985). They are autonomous state structures at the regional level. Their controlling Councils are made up of weighted numbers of nominated representatives from the racially segregated local authorities in their areas of jurisdiction. This system of representation favours the wealthier (inevitably white) local authorities. RSCs are funded by a tax on the turnover and payrolls of businesses in their regions. By June 1989 there were 16 functioning RSCs around the country (Thornhill,1989:42).

At the time of their establishment, RSCs were envisaged as having three potential roles. The first such role was to supply bulk services such as sewerage, water and electricity to all local authorities in their regions. RSCs were supposed to buy these services from bulk suppliers such as Eskom and resell them to local authorities in the region for a marginal profit. In return they would undertake to extend and upgrade existing bulk service networks. It was hoped that this would ensure that black local authorities in particular would receive cheaper and more reliable bulk services. This role has not been played effectively in any region. The provision of bulk supplies has continued to be the responsibility of white municipalities or supply authorities such as Eskom. In order to comply with the Act, bulk supplies are "bought" by RSCs and "sold" directly back to these suppliers. Revenue and expenditure columns on RSC financial statements therefore show identical amounts for the purchase and resale of these services, including electricity.

The second role of RSCs was to replace divisional councils, state structures which had historically provided services in peri-urban areas in the Cape Province. In that province, RSC's have taken over the responsibilities of the 35 divisional councils. A number of these areas are relatively well established coloured group areas which have never been constituted as local authorities. Members of the coloured House of Representatives in the Tricameral Parliament have refused to have any part in the creation of segregated local authorities for coloured group areas. The Western Cape RSC supplies services to Atlantis, Mamre, and a number of new coloured areas such as Blue Downs and Delft (Eksteen,1990).

There are no reliable statistics on the extent of electricity provision by RSCs. The figures shown on Tables 1 and 2 are based on the data listed for electricity supply in Atlantis and Blue Downs only. As such the 8 416 consumers served represent only 0.3% of all consumers served in South Africa. They consume only 242 GWh of electrical energy, 0.2% of the electrical energy distributed in all parts of South Africa (Eskom,1990b).

Where an RSC carries out the task of distributing electricity it usually has its own small electricity department. Given the lack of information about these departments, it is not possible to speculate on their financial performance or economic efficiency. The fact that a number of areas within the jurisdiction of the Western Cape RSC, such as Uitsig, are unelectrified would seem to indicate that

RSCs are not effectively supplying electricity to all potential consumers. It would appear that the provision of electricity by RSCs is an anomaly which has arisen because of the failure of the system of racially segregated local government.

The third role envisaged by the designers of the RSC system was that of providing loan capital to local authorities for development projects. RSC tax revenues are placed in a development fund and loaned out at very low interest rates. The role of RSCs in financing new electrification projects is described in chapter four.

At the time of its creation, supporters of the RSC system suggested that RSCs might progressively take over the actual distribution of electricity, effectively resulting in the consolidation of regional electricity distribution authorities. This would have required that they take over the staff and tasks (and the revenue or losses) of local authority electricity departments. This has not occurred. Given the current fluidity in local government politics, it would be unlikely to occur in the near future. Since the RSC system is based upon the concept of racially divided local authorities, it would presumably be changed under a non-racial constitution. The staff and responsibilities of RSCs might be consolidated into the administrations of non-racial local authorities with redrawn boundaries.

2.6 Eskom Distribution and Marketing Group

In terms of the Electricity Act (Act 41 of 1987) and the Eskom Act (Act 40 of 1987), Eskom has the statutory authority to be involved in a wide range of activities "to provide an efficient and cost-effective supply of electricity to any body or person in South Africa".

Eskom is an autonomous public corporation that is financed exclusively by its borrowings on capital markets and by retained earnings. Eskom is a very large and complex organisation. As an indication, it received R9.271 billion from the sale of electricity to all consumers (including bulk consumers) and employed 51 554 people in 1989 (Eskom,1990a). Its Distribution and Marketing Group is made up of twelve regionally based distribution authorities. The history of Eskom and its role in the ESI were described in section 2.2.

Despite the fact that Eskom has in the past concentrated on the generation and bulk supply of electricity, it is still a very substantial supplier of electricity to end consumers. As is reflected in Tables 1 and 2, Eskom served 7.2% of all industrial and commercial consumers in South Africa in 1989. However, Eskom's industrial and commercial consumers used 54.6% of the electrical energy consumed by all industrial and commercial consumers nationwide (Eskom,1990b). Eskom is also the sole supplier to the South African Transport Services (for railway traction) and to users in rural areas. Apart from a small group of mines which generate their own electricity, Eskom also caters for the needs of the mining sector.

Where Eskom distributes electricity within the area of jurisdiction of a local authority it requires the consent of the relevant local authority and the Electricity Control Board. An example of where this has occurred is in Nyanga, a township close to Cape Town, which falls within the boundaries of the Ikapa Town Council.

Eskom served 5.1% of all domestic consumers in South Africa in 1989. Eskom's domestic consumers consumed 6.2% of the electrical energy consumed by all domestic consumers. The number of domestic consumers served by Eskom declined sharply after 1988, when Eskom sold distribution networks that it had owned and operated in the Western Cape to a number of municipalities in the Tygerberg area.

In total, Eskom serves 9.3% of all end consumers (excluding bulk consumers) in South Africa. The consumers served by Eskom used 59.6% of all of the units of electricity consumed in 1989 (Eskom,1990b).

Since its internal re-organisation in 1985, Eskom has implemented programmes intended to raise the productive efficiency of the organisation. Strategic business units have been formed within all divisions in order to increase the cost consciousness of all employees. Based on a total staff complement in 1989 of 51 554, and a total of 228 344 consumers, the ratio of consumers served per employee is 4.44. This is extremely low. It should be remembered, however, that these ratios are not strictly comparable with other electricity distribution authorities, since many Eskom employees are involved in activities related to the generation and transmission of electricity.

Eskom has committed itself to the idea of "Electricity for All" in South Africa. In

a few areas, mostly small black townships, Eskom has electrified homes using its own financial resources. In such cases it has persuaded the responsible local authority to cede its right of supply to Eskom. One such case is the township of Kuyasa, outside Colesberg in the Karoo. In a few other situations, and again with the permission of a local authority, Eskom has set up joint venture companies as electricity distribution authorities. The operation of these private companies as distribution authorities is considered in section 2.7.

Eskom's goal of bringing electricity to all potential consumers has been constrained by the present structure of the electricity supply industry. It has been noted already that the Electricity Act gives local authorities the prior right to supply electricity in their areas of jurisdiction. It has also been noted that very few local authorities are prepared to cede this right. As a result of these problems Eskom's support for wider electrification has not led to any substantial electrification initiatives. This lends further support to the argument that institutional problems in the ESI are the main obstacle to the ongoing electrification of urban areas in South Africa.

2.7 Privately Owned Electricity Distribution Authorities

The Electricity Act (Act 41 of 1987) makes provision for the existence of privately owned distribution authorities. According to the Act, they must obtain a licence to sell electricity from the Electricity Control Board (ECB). Within the area of jurisdiction of a local authority, these companies must also obtain the permission of that local authority.

In the issuing of licences, the ECB has wide discretion to determine the size of an undertaking, the consumer types to be served, and quality of supply that must be provided. The ECB is made up of seven to nine people, appointed by the Minister of Mineral and Energy Affairs. No more than three of these members may be employed in the public sector. The ECB determines the tariffs which may be charged by licensees. Information regarding the financial performance of the licensee and the tariffs it has charged must be submitted to the ECB on an annual basis, six months after the end of each financial year.

A number of very small private electricity undertakings are licensed to generate and distribute electricity in off-grid rural areas. In urban areas only two privately owned distribution authorities exist. Both are joint venture companies (JVCs) established by Eskom. The one is Kwanolec (Pty) Ltd., supplying electricity to the Eastern Cape township of KwaNobuhle. It is jointly owned by Eskom and by a number of businesses in the area which employ substantial numbers of township residents. By September 1990, Kwanolec served approximately 1700 consumers (van Zyl,1990). Kwanolec is examined as a case study in section 2.9.3.

The second privately owned urban distribution authority is Kescor (Pty) Ltd. which was established in August 1990 to supply electricity to the self-governing "homeland" of KaNgwane in the Eastern Transvaal. Electricity had previously been supplied in the area by the KaNgwane Department of Public Works. Kescor is jointly owned by Eskom and by a trust fund formed by the government of KaNgwane. This scheme was devised under the direction of Eskom's Reticulation Market Development department (Mare and Whyte,1990).

During 1990, Eskom continued its efforts to establish JVCs to replace black local authority electricity departments. The Eskom annual report for 1989 notes that 48 such projects were under discussion in March 1990 (Eskom,1990a). At the end of 1990, investigations were started into the establishment of JVCs to serve all the townships around both Port Elizabeth and Cape Town (Bradbury,1990).

2.8 Electricity Distribution Authorities in the "Homelands"

Independent electricity corporations have been set up to supply bulk electricity in the three "independent homelands" of Transkei, Bophutatswana and Venda. These corporations are respectively Tescor, Becor and Vecor. In the Ciskei, which is also nominally independent, bulk electricity is supplied by the Ciskei Department of Public Works. Like Eskom, Becor and Tescor sell electricity in bulk to large municipalities in addition to supplying a number of users directly themselves. Vecor appears to sell electricity directly to all consumers inside Venda.

Becor buys all of the electricity that it sells from Eskom. It sells 30.5% of this

energy to municipalities in bulk, and distributes the remainder to 35 136 other end consumers. No statistics are available for the number of consumers served by municipalities in Bophutatswana (Eskom,1990b).

Tescor generates approximately two-thirds of its energy needs from hydropower and buys the rest from Eskom. 51.2% of this energy is resold to municipalities in bulk. The remainder is distributed to 1 313 industrial and commercial users and 3 498 domestic users. No statistics are available for the number of consumers served by municipalities within Transkei. Dingley (1990:5) provides an estimate of 10 000 consumers in the Transkei.

Vecor buys 99% of its energy needs from Eskom and the remaining 1% from the Louis Trichard municipality. All of this energy is apparently resold directly to 914 industrial and commercial users and 4 321 domestic users (Eskom,1990b).

In the self-governing (but not independent) "homelands" of KwaZulu, KwaNdebele, Gazankulu, Lebowa, and Qwaqwa the responsible supply authorities are government departments (usually the Department of Public Works) of those territories, with the assistance of the (South African) Department of Development Aid. In KaNgwane, electricity is provided by Kescor (Pty) Ltd., as described in section 2.7. No statistics are available for the number of consumers served in these areas.

The coloured rural reserves, such as those found in the Namaqualand, are in a slightly different position. The Rural Coloured Areas Act of 1963 (Act 24 of 1963) and more recently the Rural Areas Act (House of Representatives) of 1987 (Act 9 of 1987) makes provision for elected management boards with the full powers of local government in their areas of jurisdiction. Electricity provision in these areas is very limited and is carried out by these boards. In 1990, there were only 427 electricity consumers in these reserves. Approximately 9% of all houses had access to electricity (Borchers et al,1990:29).

Given the limited statistics available for distribution authorities this sector, it is not possible to make any conclusive comments about their financial performance or economic efficiency. It is clear however, that they have not been effective in making electricity widely available. Using the figures for distribution to end users by Becor, Tescor and Vecor only, "homeland" consumers represent 1.8% of all

users in the whole of South Africa. They consume 1.2% of all the electrical energy used nationwide (Eskom,1990b). This is true despite the fact that approximately 9 million, or around 25% of the total population of South Africa, lived in these areas in 1989 (The Economist,1990b). The challenge posed by the electrification of these rural and village areas is substantial.

2.9 Case Studies: Electricity Provision by the City of Cape Town, the Lingelethu West City Council and Kwanolec (Pty) Ltd.

In this section, the provision of electricity by the City of Cape Town, a white municipality; by the Lingelethu West City Council, a Black Local Authority; and by Kwanolec (Pty) Ltd., a private company, will be described. The purpose of the section is to enrich the general discussion on the electricity distribution authorities distribution that has gone before. The focus in the descriptions which follow will therefore again be on the financial performance, economic efficiency and effectiveness these distribution authorities.

2.9.1 Electricity Provision by the City of Cape Town Electricity Department

The municipal area of the City of Cape Town includes the entire area from Camps Bay on the Atlantic Ocean, to Muizenberg on False Bay, and takes in a number of areas on the Cape Flats. According to the 1985 population census, the total population of this area was 776 572. The municipal area includes white group areas, and some coloured group areas. In 1985, only the 206 767 white residents of Cape Town were fully represented on the city council. The remaining 569 805 people, whilst they receive services from the municipality, have no effective representatives at municipal level (Official Municipal Yearbook,1989:344).

The area of supply of the Cape Town Electrical Engineer's Department is much larger than the municipal area of the City of Cape Town. It includes the areas of

jurisdiction of a number of smaller white municipalities, such as Milnerton, Fish Hoek and Simonstown. The Department is also the licensed supplier of electricity to the townships of Langa and Gugulethu which fall within the area of jurisdiction of the Ikapa Town Council, a BLA. The total population of the area served by the electricity department was estimated to be 1 243 000 in 1989 (Eskom,1990b). The total population of the greater metropolitan Cape Town (including Wellington, Paarl, Stellenbosch, Somerset West and the Strand) at that time was estimated to be around 3 million people (Urban Problems Research Unit,1990:16).

Electricity was first provided in Cape Town in 1895, and was generated at the Molteno Reservoir, the first hydro-power station in Africa (Oliver,1989). Today the City owns three operable power stations: two at Athlone (a 180 MW coal-fired station and a 40 MW gas turbine), and one at Roggebaai (a 50 MW gas turbine). In addition it owns a 180 MW pumped storage station at Steenbras. As a result of Eskom's "capacity allocation" scheme, only the pumped storage station at Steenbras is fully operational. As a result of this agreement, the bulk electricity demand charge payable by the City of Cape Town to Eskom each month is reduced by the potential output of the unused stations. The effective rebate in the 1990/91 year, will be in the order of R50 million, representing a discount of approximately 16% on the total Eskom bill for the year (Mickeleit,1990).

In terms of its annual sales of electricity, 3 577 GWh in 1989, the City of Cape Town electricity department is the fourth largest supply authority in the country. In terms of the number of consumers that they serve, 234 546 in 1989, it is second only to Durban, which has 254 444 consumers (Eskom,1990b).

Of these 234 546 consumers, 93.2% were domestic, 6.5% were businesses and 0.2% were industries. The remaining 0.1% of consumers were not defined. Of the total electrical energy sold, 44.8% was consumed by domestic users, 16.1% by businesses and 34.3% by industrial users. The remaining 4.8% was consumed by undefined users (Eskom,1990b).

Financial Performance

The financial performance of the electricity department is revealed by the following statistics. The budgeted operating expenditure of the entire municipality for the 1990/91 financial year was R1.201 billion. This amount was to be raised primarily from property rates (24.6% of the total), and sales of trading services (abattoir, wholesale market, water and electricity) (49.8% of the total). Gross income from the sale of electricity alone was expected to be R 527.6 million (Cape Town,1990b:22).

On the expenditure side of the City budget, money went primarily on salaries and wages of municipal staff (41.7% of the total), on servicing municipal debt (16.1% of the total) and on purchases of electricity from Eskom (22.2% of the total) (Cape Town,1990b).

The total budgeted expenditure by the electricity department was expected to be R471.6 million. 56.6% of this total, or R267.1 million was set aside for bulk electricity purchases from Eskom. The annual increase in operating expenditure over the previous year was 17.7%, 4.7 percentage points more than the Department of Finance limit on the municipality as a whole of 13% (Cape Town,1990b:22).

The total capital expenditure of the City in the 1990/91 financial year was expected to be R313 million. This amount was to be raised entirely from accumulated internal funds, and no new loans were to be raised on outside capital markets. This capital was to be spent on the upgrading of general municipal buildings and equipment (46.2% of the total), on new council housing (16.1% of the total), and on the extension and upgrading of trading service systems (including electricity networks) (37.7% of the total) (Cape Town,1990b:19).

The capital expenditure of the electricity department in the period was to be R57.1 million, or 18.2% of total expected municipal capital expenditure. Much of this was for the extension of the area of supply to Sun Valley, near Noordhoek on the southern peninsula. The increase in capital expenditure over the previous year was 35.2%, 22.2 percentage points higher than the overall Department of Finance limit of 13% (Cape Town,1990b:19).

The surplus generated by the electricity department for the 1990/91 year was to be R56.0 million. This would represent a surplus on trading of 11.9% (Cape Town,1990b:22). The department is thus clearly highly profitable. The domestic tariff for most of 1990 included a basic charge of R3 per month and an energy charge of 10.53c/kWh (Mickeleit,1990).

In terms of the second measure of financial performance, that of relative indebtedness, the department is also performing well. At the end of the 1988/89 financial year the total outstanding debt of the department was R201.6 million. This was made up of R191.2 million owed to municipal capital development funds and R10.4 million owed to external sources (Cape Town,1990c:2). As was mentioned in section 2.3.1, R44.7 million was spent in the 1988/89 financial year on servicing commitments arising from this debt. This represented 14.2% of operating expenditure (Cape Town,1990a:39). The total current capital assets of the department were listed at that time as being R363.7 million (this figure is not strictly comparable to the asset listings of private companies in South Africa as a result of different accounting procedures being used). The financial standing of the department is thus very good. Relatively modest rates of system expansion are easily within the ability of the well-developed consumer base to sustain. The department has relatively few problems in obtaining capital, and no problems in servicing loans (Mickeleit,1990).

Economic Efficiency

The values for quantitative indicators of economic efficiency of the City of Cape Town electricity department were provided in section 2.3.2. The ratio of consumers per employee in 1989 was 92.1, up marginally from 83.8 in 1985. It was noted that this figure is relatively low by global standards. The other indicator of changes in economic efficiency, the rate of change of expenditure on labour costs relative to the rate of change of output, showed that while real labour costs per employee rose by 6.3% between 1895 and 1989, departmental revenue per employee rose by only 1.4% and the amount of electricity sold per employee increased by an average of only 3.6% per year (Cape Town,1990a:39). According to this second measure then, productive efficiency fell marginally during the period. These two indicators provide the impression that productive efficiency has not increased dramatically over the last five years, and is also probably not

very high relative to other electricity distribution authorities around the world. This is so despite the fact that the department's power stations are not operating fully, and staff numbers are being reduced by natural attrition.

More qualitative measures of economic efficiency provide a similar picture. The City of Cape Town has certainly been affected by budgetary constraints imposed upon it by the Department of Finance. This is made quite clear in budget documents (Cape Town,1990b). A division within the city treasurer's department responsible for conducting "value for money budget reviews" was set up in 1989. This unit, together with a firm of chartered accountants, has recently begun an investigation into the operating efficiency of various municipal departments (Cape Town,1990b:9). Despite these pressures, the electricity department was allowed to increase both its capital expenditure and its operating expenditure at rates above those imposed on the municipality as a whole.

While it is not clear that the efficiency of the department has increased appreciably, number of measures have been adopted inside the department due to the existence of the budgetary constraints faced by the municipality as a whole. For example, a system which supposedly ensures better flows of financial information in all municipal departments has been instituted. Detailed computer printouts are issued by the city treasurer's department to all sub-department heads on a monthly basis (Mickeleit,1990).

The problem of shortages of adequately trained engineers and managers has also affected the electricity department adversely. The ability of the department to attract and retain suitably qualified personnel has been a problem for a number of years. Staff turnover in the 1988/89 year was 11.44%. Many of the staff lost were young engineers with managerial potential. This problem was ascribed to the fact that salaries and other incentives offered in the private sector were more attractive than those that could be offered by the department (Cape Town,1990a:2).

In conclusion, it would appear that there is little evidence to suggest that the City of Cape Town electricity department is more efficient than other large, semi-autonomous enterprises within the state sector. On the other hand there is no reason to believe that it is any less efficient than other similar organisations.

Effectiveness

All homes, businesses, industrial and other sites within the area of supply of the City of Cape Town electricity department have access to electricity. Almost all new connections by the department reflect the electrification of recently constructed houses in newly housing areas (Hyde,1990). The total number of consumers served grew from 230 674 to 235 055 in the course of the 1988/89 year, a rise of just 1.9% (Cape Town,1990a:24).

Within the area of supply of the department there are a number of low income areas. In two black townships, Langa and Gugulethu, a number of residents are in arrears. The supply to some consumers has been disconnected. Information on the extent of this problem is not widely reported. For example, no direct reference is made to the extent of arrears or disconnections resulting from Langa and Gugulethu in the annual reports of the City Electrical Engineer for 1988 or 1989. It is only noted that 142 123 disconnection orders were issued by the City treasurer's department for failure to pay electricity accounts in the course of the 1988/89 year, and that 27 176 actual disconnections were carried out (Cape Town,1990a:24). It can be assumed that the problems experienced in these two townships have resulted partly from the inability of residents to pay for electricity used. To an extent, this reflects a failure on the part of the department to effectively supply these areas. Various creative strategies such as the installation of load limiting devices (in order to charge lower, more easily affordable tariffs for a limited supply) or pre-payment metering systems to assist residents in budgeting for their electricity consumption have not yet been actively pursued.

The orientation of the department is reflected in its mission statement, which reads as follows. The Electricity Department seeks to:

i. Supply electricity to meet present needs as cheaply as possible by optimising energy supplies from the Council's power stations and Eskom.

ii. Develop the electricity supply system to meet anticipated future needs and controlling peak demands by load management, metering and tariff arrangements.

iii. Advise and encourage consumers to use electrical apparatus more efficiently, thereby improving utilisation and maintaining or improving environmental standards.

iv. To provide a reliable and efficient service on a 24 hour basis, thereby retaining good consumer relationships.

(Cape Town,1990c:1)

These goals reflect the fact that the department is a well developed electricity distribution authority, serving a relatively well developed area. It has functioned reasonably effectively in terms of the goals that it has set itself. Of course, this effectiveness is restricted to the area that the department serves. The black and coloured townships just outside this area of supply are not adequately electrified. Once again, it might be said that the department is effective precisely because it has been insulated from the areas where the greatest need exists for the effective provision of electricity, and where the profitability of electricity provision is less easily assured.

2.9.2 Electricity Provision by the Lingelethu West City Council Electrical Department

The municipal area of the Lingelethu West City Council covers the established parts of the rapidly growing township of Khayelitsha, on the Cape Flats. The total population of Khayelitsha is hard to estimate, since there is a continual influx of people to the area. The Urban Problems Research Unit reports an estimate by Thomas of the total black (African) population of the greater Cape Town metropolitan area in 1990 of 925 000 (Urban Problems Research Unit,1990:16). The population of Khayelitsha in 1990 was thus probably in the region of 500 000. Khayelitsha was created in the early 1980s once the government finally recognised that the influx of black South Africans into the Western Cape necessitated the rapid development of new residential areas.

Khayelitsha is resembles most black townships in urban areas of South Africa in that massive informal housing settlements exist side by side with small pockets of up-market formal houses. The area is almost entirely residential, apart from a small number of retail stores, petrol stations, schools, churches, clinics and other community buildings.

Khayelitsha is still in the process of being developed. The Land Development Co-ordination Directorate of the Cape Provincial Administration (CPA) is responsible for the physical development of the new areas of Khayelitsha. The electricity networks in formally planned new areas (as opposed to new informal shack settlements) are designed by consultants and installed by private contractors. Upon completion of a new area, it is incorporated into the area of jurisdiction of the Lingelethu West City Council.

Whilst it is not expected to co-ordinate the process of development of the new areas, the Council is expected to pay for the infrastructural systems that are constructed, within the BLA financial system as described in section 2.4.1. Capital used for the construction of basic infrastructure is arranged by the provincial authorities, usually from the National Housing Fund. According to one estimate, the development projects carried out thus far have cost approximately R350 million, of which about 10% was spent on the development of the electrical network. The capital loaned from the National Housing Fund is repayable over twenty-five years at interest rates of around 11.25% (Scholtz,1990).

As a result of this arrangement, the Council is responsible only for the ongoing maintenance and operation of the electrical networks. The Council has an Electrical Department which falls under the control of the Town Engineer. It was established in 1988, when the Western Cape region of the CPA decided to dissolve its own small electrical maintenance unit. This unit had previously assisted all BLAs in the region with electrical repairs and maintenance. A deal was struck at the time to transfer the entire staff of this unit to the Lingelethu West City Council. The total staff complement at the end of 1990 was 35 people.

The statistics presented in this section are all very approximate, as a result of the lack of established systems of collecting and analyzing information about the electricity system. The Council buys all of its electricity in bulk from Eskom. The bill paid to Eskom in the 1988/89 year was approximately R3 million (van der

Westhuizen,1990). As a comparison, one of the City of Cape Town's larger consumers, the University of Cape Town, paid about R3.6 million for the electricity that it consumed in the same period (University of Cape Town,1990).

At the end of November 1990, the total number of consumers served by the department was about 4120. Of these, about 820 have conventional credit meters and about 3300 have prepayment meters. Of the 820 with conventional meters, at least half are non-residential users, mostly schools, clinics and churches in areas where domestic supplies are not provided. The domestic tariff in 1990 was 15c/kWh, with no basic charge (van der Westhuizen,1990).

The approximately 3700 domestic users are all in formal housing areas. Based on the assumption that six people live in each electrified household, some 22 000 people live in electrified homes. Using a population estimate of 500 000, this would imply that about 4.4% of the population of the area have electricity.

Financial Performance

The financial performance of the Lingelethu West City Council as whole has been similar to that of most BLAs. The council is dependant on an undisclosed amount of bridging finance from the CPA to balance its budgets.

The operating expenditure of the Electrical Department has grown year by year. This is not surprising since the system that it operates has grown rapidly over the last few years. The expenditure budget for the Electrical Department for the 1990/91 financial year was R3.2 million. 9% of this total was for staff salaries, 25% for physical maintenance of the system and 66% for "other general expenses". These figures were described as very rough estimates, since accurate information on the costs of different activities performed by the department are not known (van der Westhuizen,1990).

It is not known whether the Electrical Department is profitable or not. Income from electricity sales is not distinguished from income from other sources in the preparation of municipal accounts. It is suspected that the income from electricity sales exceeds the bill paid to Eskom for bulk supplies of electricity. However, the full operating costs of the department, including the staff, equipment and bulk

electricity costs, are thought to be more than the income from sales. The department thus probably runs at a loss. The Electrical Department staff are presently in the process of attempting to clarify this information (Loots,1990).

The annual capital expenditure of the Council is not known. Certainly, the capital costs involved in the ongoing development of Khayelitsha are huge. The Council has little control over this expenditure since it is arranged by the provincial authorities. No record has been kept of capital expended on upgrading parts of the network after their inclusion in the Council system. This information could possibly be obtained from the records held in the department. As a result of this situation, it is difficult to accurately describe the relative indebtedness of the department. It is certain that the loans against the National Housing Fund issued to the Council for the electrification of Khayelitsha are not being adequately serviced.

The Electrical Department of the Lingelethu West City Council is therefore not performing well in terms of the criteria of financial performance developed in this chapter. Admittedly, it is unlikely that it would be able to do so in within the flawed financial system devised for BLAs.

Economic Efficiency

The ratio of consumers served by the department per employee is currently 117.7. As was explained in section 2.4.2, this comparatively high figure is deceptive since it is based on the fact that the department is not concerned with the development of the network in new areas.

No information is available which would allow for an analysis of the rate of change of labour costs and the rate of change of output of the department. In any event, such information would be skewed by the high rates at which the system is expanding. As mentioned above, 9% of departmental operational costs were budgeted for staff salaries for the 1990/91 financial year, which compares favourably with the proportion allocated for this purpose by well-established white municipal electricity departments.

More qualitative measures of assessing the internal workings of the department

suggest that its productive efficiency is unlikely to be good. Given the very nature of the bridging finance system, and the weak system of cost accounting in place in all Council departments, it appears that no serious budgetary constraints are enforced. As a result, clear financial targets are not developed. Once prepared, budgets are not often referred to during the year. The City Treasurer's department does not issue statements to indicate how individual departments are performing against their budgets (van der Westhuizen,1990). As a result no programmatic attempt to increase productive efficiency is possible.

The department is not optimally managed. Very little attention is given to planning and organisational development. The Council has had a vacancy for the post of City Electrical Engineer for a number of years. No suitably trained person has yet been found to fill the post. As a result, the person heading up the department is legally under qualified to do so (Loots,1990). As noted, this problem is traceable, at least in part, to the fact that the salaries and career prospects offered to electrical engineers by BLAs compare unfavourably with those of most other potential employers.

In conclusion, it would appear that the Electrical Department is not yet well-developed organisationally. For this reason quantitative measures of productive efficiency are either not readily available or are unreliable. Qualitative indicators would seem to suggest that the resources are currently probably not optimally applied.

Effectiveness

As was mentioned above, the extent of electrification in Khayelitsha is very low. Only about 4.4% of the residents of Khayelitsha have access to electricity. Very little progress is currently being made to electrify further areas. Apart from the extensive informal housing areas, which have no electricity for domestic purposes, new site-and-service developments are not being electrified. Some areas of formal houses remain unelectrified. One area in particular, Khayelitsha Town 1 Village 1 & 2, was not electrified at the time of its development in the early 1980's. The Council has been unable to raise R16 million to electrify the area, despite the fact that it would probably be profitable for it to do so (Loots,1990).

Popular opposition to the Lingelethu West City Council (like most BLAs) reached new levels at the end of 1990. At one point council workers were on strike, demanding the resignation of the council itself. Renewed calls have been made by organisations opposed to the system of racially segregated local authorities for residents to boycott rent and service payments due to the Council. In the light of these events the fortunes of the Council, or of its Electrical Department are unlikely to improve.

It would not be unjust to assert that the Lingelethu West City Council Electrical Department has been ineffective. This is more the fault of the system within which the department operates than of its employees. Until that system is changed it is unlikely that reliable or affordable electricity will be provided to the area.

2.9.3 Electricity Provision by Kwanolec (Pty) Ltd.

KwaNobuhle is a small township in the Eastern Cape, outside the town of Uitenhage. Its total population is approximately 100 000 people. About 15 000 of the township residents are formally employed in the industries which are situated in Uitenhage (van Zyl,1990).

Prior to the formation of Kwanolec, a few non-residential consumers of electricity were supplied by the Uitenhage municipality. This task was progressively taken over by the KwaNobuhle Town Council. By 1987 the Council provided electricity for street lights, municipal facilities, a small number of businesses and about 170 domestic consumers (van Zyl,1990). The system was developed using funds provided largely by the National Housing Fund. In the mid-eighties work began on the construction of an upgraded bulk supply system. As a result of township unrest in 1985 and 1986 this work did not proceed as planned.

In early 1987, the Uitenhage branch of the Midlands Chamber of Industries (MCI) made a decision to become actively involved in the development of the townships around Uitenhage. The MCI lobbied local, provincial and central government authorities in an attempt to gain support for the electrification of KwaNobuhle.

In May 1988, the MCI contacted Eskom. Staff of Eskom considered the project, and explored the concept of forming a joint venture company (JVC) to serve the area. A JVC, the KwaNobuhle Electricity Supply Company (Pty) Ltd, was formed on 1 January 1989, and registered in terms of the Companies Act. As such, it is a private company and can be sued and held liable for its debts. It must also pay corporate taxes.

Kwanolec was set up with R4 million of working capital, obtained through a share issue which was subscribed by Eskom and by companies active in the MCI. Eskom provided 50% of the share capital. Volkswagen provided a further 24%, and Goodyear 6.6%, of the share capital. The balance of the capital was provided by other companies in the area. Kwanolec's directors were appointed by its major shareholders. The board is currently made up of one Volkswagen representative, one Goodyear representative, and two Eskom representatives. There is no community representation on the board of directors.

The KwaNobuhle Town Council agreed to cede its right to supply electricity to the township to Kwanolec. Accordingly, the Electricity Control Board (ECB) recognised Kwanolec as the licensed supplier in the area. The existing electricity system was leased to Kwanolec. In return Kwanolec was to pay an annual franchise fee to the council of 1% of revenue from electricity sales. In addition a usufruct fee was to be paid to the Council, linked to the profitability of the company. The usufruct fee was an annual amount equal to 40% of company profits, calculated after providing for loan repayments but before tax. According to the agreement, this fee was not to exceed R2.25 million per annum (Kwanolec,1988:3).

In order to develop the existing system a loan of R25 million was obtained from the Development Bank of Southern Africa (DBSA). The loan was repayable at a 10% interest rate over 20 years. Loan disbursements were to be made as and when construction projects were under way. It was agreed that interest on the loan would be capitalised for the first five years (Henn,1990).

A business plan was drafted in 1988. It predicted that the outstanding 11 000 unelectrified houses in the township would be electrified by 1992. Prepayment meters and readyboards were to be used in the houses, and aerial bundle conductors were to be used to reticulate the area. A connection fee of R50 was

to be charged, but free credit of R30 would be issued to every new consumer. The tariff charged was initially planned to be 15c/kWh, but was later reduced to 13,6c/kWh when the loan from the DBSA was obtained (van Zyl,1990).

The corporate structure of Kwanolec was designed on the basis that all aspects of the normal work of a distribution authority would be contracted out to other organisations. The task of managing the company was delegated to a general manager, who was to be a senior Eskom employee in the Eastern Cape region. The present general manager operates from an office in Port Elizabeth, fifty kilometres from KwaNobuhle. The maintenance of existing networks was to be performed by Eskom staff in the Uitenhage district. In payment for these services, Eskom would be paid 10% of the company's operating revenue (van Zyl,1990).

Eskom staff in the Uitenhage region were also intended to design and install new systems as the township was electrified. In exchange it would be paid an amount equal to 2% of the capital expended on each projects each year. The task of selling pre-payment meter credit cards was to be contracted out to private vendors. These vendors would be entitled to hold back 2% of the value of electricity credit that they sold. The book-keeping and financial management of Kwanolec were contracted out to a private accounting firm, Coopers and Lybrand. They were to be paid on a month by month basis, according to the time expended on work for Kwanolec (van Zyl,1990).

Kwanolec has been beset by problems since its formation. Organised community resistance to the fact that Kwanolec is a private company has slowed the number of new connections to a trickle. Organisations aligned to the Congress of South African Trade Unions, the African National Congress and the Uitenhage Residents Civic Organisation (Ureco) have opposed the efforts of the company. These organisations have argued that electricity, as an important social service, should be supplied by an organisation within the public sector (Ureco,1990). They have called upon Kwanolec not to proceed with connections until the issue of forming a single non-racial municipality in the Uitenhage area has been resolved. Kwanolec agreed not to proceed until the approval of URECO was forthcoming. By August 1990, 18 months after the establishment of the company, only about 1700 consumers had been connected. The deadlock between Kwanolec and URECO had not yet been broken (van Zyl,1990).

Financial Performance

Kwanolec has yet to show a profit. As a result of the slow take up rate and the smaller than expected consumption of new consumers, revenues have been disappointing. The company is currently operating at a loss. No taxes have yet been paid by the company, nor have any dividends on shares been declared.

The MCI members who hold shares in Kwanolec have yet to see any meaningful return, financial or otherwise, on their capital investment. After the company was launched these shareholders announced that they would re-invest any earnings back into the company. Eskom's return on the project has also been less than expected. Not only has their R2 million not shown any appreciable return, but their input into keeping the Kwanolec scheme running has certainly cost the Eastern Cape region more than they have received in payment for their services.

The KwaNobuhle Town Council has also not done well from its arrangement with Kwanolec. Since no profits have been made, no usufruct fee has been paid. The franchise fee on the sales of electricity has been forthcoming, but has been less than expected. The Town Council has outstanding loan commitments in lieu of the original development of the electrical system in the area (which were not taken on by the company) of around R25 million. These loan commitments are presumably not being met.

It is also worth noting that the regulatory regime under which Kwanolec operates is very loose. Financial statements are submitted to the regulatory agency, the ECB, once every year, up to six months after the close of the financial year. Tariff changes must also be submitted to the ECB for approval. Prior to December 1990, Kwanolec had yet to request a tariff change.

Kwanolec has yet to draw the bulk of the R25 million offered by the DBSA. As a result, it has not yet incurred sizeable debts. Because the loan agreement made provision for the capitalization of interest payments for the first five years after the signing of the agreement, it would benefit Kwanolec to proceed with the installation of the entire system as soon as possible. It should be noted that Kwanolec has been fortunate to gain access to very cheap capital from the DBSA. Without this capital the project would not be financially viable at the level of tariffs currently charged. The involvement of Eskom in the company contributed

substantially to the confidence of the DBSA in the project (Henn,1990).

Economic Efficiency

It is difficult to specify the productive efficiency of Kwanolec in terms of quantitative indicators. Since Kwanolec has no full-time staff, but contracts out a range of services, ratios of consumers per employee are hard to specify. From a breakdown of monthly costs of the company in June 1990 it is possible to determine the proportion of operating costs spent on the acquisition of different services. During that month, total income (mostly from electricity sales) was R107 098. Total expenditure (including depreciation of assets) was R145 927, resulting in a net deficit (before interest charges and payments to the KwaNobuhle Town Council) of R38 829. Electricity purchases accounted for 64.3% of the operating expenditure, depreciation for 20.0%, and other operating expenses for the remaining 15.7% (Coopers and Lybrand,1990:1).

The book-keeping and financial management of Kwanolec by Coopers and Lybrand cost R4 500 in the month of June 1990. The management of the company and the maintenance work it carries out are provided by Eskom for only 10% of the monies collected from sales of electricity each month. Thus in June 1990 Eskom was paid only R10 710 for these services. The contribution of the Kwanolec General Manager and of other Eskom staff to establishing the company has been very substantial, and the fee paid by the company does not cover the real costs of providing these services (van Zyl,1990). As a result of this special arrangement with Eskom, Kwanolec is probably more "efficient" on paper than other distribution authorities with similar number of consumers.

Effectiveness

Kwanolec has not been effective in providing electricity to all potential users in KwaNobuhle. The reasons for this failure have clearly had more to do with political opposition than technical, or even financial obstacles. This opposition has arisen, at least in part, as a result of the fact that Kwanolec is a private company, with no structural accountability, direct or indirect, to the community that it is supposed to serve. The experience of Kwanolec demonstrates once again the

importance of proper attention to institutional issues in the provision of electricity.

2.10 Conclusion

The descriptions of electricity distribution authorities in urban areas of South Africa provided in this chapter reveal a number of important issues. Firstly, the discussion of the financial performance of distribution authorities showed that electricity distribution by white municipal electricity departments is generally profitable. Surpluses generated through the sale of electricity are commonly used to subsidise rates.

Secondly, black local authorities have failed to effectively provide electricity to black townships. Most BLAs have experienced severe financial problems, and popular opposition to BLAs has also severely limited their ability to act as agents of meaningful development in black townships. These problems, and the failure of the government to allocate sufficient funds through formal channels for infrastructural development have crippled the electrification effort.

Thirdly, the examination of the electricity departments of the City of Cape Town and of the City Council of Lingelethu West suggested that the productive efficiency of electricity distribution authorities in South Africa is low by international standards. In the case of Cape Town, which is probably amongst the most efficient departments in the country, efficiency has also not improved appreciably in the last decade.

Fourthly, the distribution sector of the South African ESI is highly fragmented, resulting in dis-economies of scale and other institutional and financial problems in many areas. Staff and capital shortages limit the efficiency and effectiveness of small distribution authorities run by BLAs, RSCs, "homeland" corporations and municipalities, and privately owned companies. A strong case can be made for the revision of the parts of the current Electricity Act which relate to the distribution of electricity in South Africa. A proposal already forwarded by Dingley (1990:11) involves the rationalisation of distribution authorities on a regional basis. Aspects to be considered in the rationalisation of the ESI in South Africa will be developed in later chapters.

CHAPTER THREE

THE IMPLEMENTATION OF ELECTRIFICATION PROJECTS IN URBAN AREAS OF SOUTH AFRICA

3.1 Introduction

The aim of this chapter is to examine the implementation of electrification projects in urban areas of South Africa. In this context, the term "electrification project" implies the extension of electricity systems in order to provide electricity to new consumers.

The process whereby such projects are carried out and the various institutions involved will be described. The range of different technologies that can be used to construct electrical networks will not be discussed in any detail here, since the scope of this study has been limited to financial and institutional issues. The investigation of technical issues related to the electrification of urban and rural areas is an extremely important and broad research area, which could not be addressed in a study of this scale.

As was noted in chapter two, there are currently approximately 2.5 million consumers of electricity in South Africa, of which just more than 2 million are domestic users (Eskom,1990b). Comparable statistics indicate that there were approximately 1.2 million domestic consumers in 1985 (Eskom,1987). According to these sources then, the number of electrified homes in South Africa grew between 1985 and 1989 by an average of 160 000 per year. This growth may not be entirely due new connections. Growth in numbers may also represent, in part, the fact that the quality of statistical information available for electricity provision to domestic users has improved. Dingley (1990:22) has estimated that it would be necessary to electrify 350 000 homes every year for twenty years in order to bring electricity to all.

The various tasks that arise from the implementation of electrification projects can be divided into three categories. The first category is planning and co-ordination,

which includes all general tasks which arise as the electrical network in a township grows, step by step. These include the following:

i. Performing planning studies and preparing macro-level design guidelines for the electrification of new townships.

ii. Monitoring the overall development of the electrical network in a new township, as particular electrification projects progress.

iii. Ensuring that micro-level design of new parts of the network by electrical engineers is in compliance with the macro-level design guidelines.

iv. Approving plans for internal electrical systems and house wiring schemes where these are the responsibility of developers constructing a number of houses in one area.

v. Organising loan finance from funding agencies to pay for projects, where necessary.

A second category of tasks, ordinarily performed by project electrical engineers, is design and supervision of construction, which involves the following tasks:

i. The preparation of micro level designs of new parts of electrical systems. This involves the creative arrangement of elements such as poles, cables, transformers, switchgear and protective equipment into a workable system; as well as the specification of details of the equipment and construction processes that will be used. Depending on the nature of the project, design specifications might be prepared for the proposed layout of medium-voltage bulk systems, or for low-voltage networks.

ii. Supervision of system construction. In most instances the designer is responsible for ensuring that the finished product complies with the design specification and with all applicable safety and other

regulations. On large or technically complex projects a clerk of works may be appointed to monitor the progress of construction.

The third category of tasks is the physical construction of a new parts of an electrical network. This involves the physical installation of the network: digging trenches, planting poles, stringing cables, constructing sub-stations and connecting up different parts of the system.

Electrification projects involving the connection of substantial numbers of new consumers to the grid ordinarily take months, if not years to complete. Each project involves a variety of different agencies, units and institutions, even where these projects are done in-house. Thus, the interaction between these institutions is often crucial to the success of projects.

For the purposes of this chapter, the implementation of electrification projects in urban areas will be described as it occurs in new black townships; in the areas of supply of white municipal distribution authorities; and in established black townships. In each of these areas the range of institutions and organisations involved is different. In each of these sections, project implementation is discussed in three parts: planning and co-ordination; design and supervision of construction; and construction.

Next, three case studies of recent electrification projects in the Western Cape are presented. These case studies are intended to illustrate the discussion in the three preceding sections. The case studies are therefore, respectively of projects implemented in a new black township (Khayelitsha), a new area within the area of supply of a white municipality (Turfhall Park), and an established township (Nyanga).

3.2 The Electrification of New Black Townships

Prior to the 1980's, very little urban planning and infrastructural development was carried out in black townships in South Africa. In the 1960's conscious attempts were made to de-urbanise blacks in urban areas of South Africa. With the belated

recognition by the government of the inviability of the "homeland" system, the basic apartheid policy of "separate development" was applied to cities. Within this paradigm, steps were taken to upgrade and develop racially segregated black urban areas. These changes led to the establishment of a number of new townships around the country such as Khayelitsha near Cape Town and Motherwell outside Port Elizabeth.

Whilst some progress in township development has been made, a serious weaknesses have been inherent in government policy in this regard. Firstly, the institutions charged with carrying out development programmes have often been unaccountable and politically unacceptable to black South Africans. The discussion of the history of black local authorities in section 2.4 demonstrated this point.

Secondly, the pace of urban development has simply failed to match that of the growth of urban populations. The result has been the springing up of large, unplanned informal housing camps near every urban centre in South Africa without access to adequate services. The black urban population in South Africa (excluding the "homelands") is currently in the region of 12.5 million people (The Economist,1990b:2). Of these, some 7 million people currently live in informal housing, in shack settlements or in shacks in the backyards of formal dwellings (Financial Mail,1990b:28).

Thirdly, the initiatives undertaken by the government have often been biased towards inappropriate standards of service provision and systems of housing delivery. For example, according to Urban Foundation research, slightly less than 10% of the black urban population can currently afford to buy formal, fully serviced houses. These houses commonly cost upwards of R35 000, and buyers usually have housing subsidies from employers and access to home loan finance from building societies and other financial organisations. A further 41% of black urban dwellers can afford to buy simpler "starter homes" with selling prices between R12 500 and R35 000 if given special access to credit. A further 43% of the black urban population can afford to buy serviced sites in site-and-service schemes. Finally, 6% of the population are unable to afford to buy any sort of housing, and are forced to rent accommodation or find other shelter (Financial Mail,1990b:29). Despite the implications of studies of this sort, the urban development and housing strategies adopted and supported by the government

have over-emphasised the importance of construction of formal housing, and under-emphasised the importance of properly planned construction and service provision to starter homes, site-and-service dwellings and the upgrading of informal settlements. Thus, for example, the 1986 Government White Paper on Urbanisation makes no explicit mention of site-and-service schemes, or of *in situ* informal settlement upgrading schemes (Urban Foundation,1990b:10).

The current approach to the provision of electricity in new black townships exemplifies these problems. Electricity is provided to most of the few new formal houses which are constructed by developers for resale to the public. In such cases, low-cost technologies such as aerial bundle conductors and simplified substations, transformers, switchgear and other system components are often used to reduce capital costs. Inside new homes, locally developed consumer distribution boxes (also known as "readyboards") are a cheaper alternative to complete house wiring. Readyboards are sealed units, commonly fitted with a switchable light, circuit breaker and a number of standard electrical sockets. The other component of low cost systems which are increasingly being utilised in South Africa are pre-payment meters. Coupons or credit cards are sold at a central point, and provide electricity when inserted into the meter inside the home.

Electricity is not provided to homes in site-and-service schemes as they are constructed. Ordinarily limited supply low-voltage systems (also known as "phase one" systems) are installed in these areas. These systems supply only local government buildings, schools and other community facilities. In most cases, the medium-voltage network in the area will be over-designed so as to enable it to meet higher demand levels once the area is fully electrified. Implicit in this approach is the assumption that electricity supply systems are too expensive, and that their installation is best left for later upgrading schemes when a distribution authority will provide a system on a cost-recovery basis.

This approach to service provision in site-and-service schemes in developing countries has a number of weaknesses. International evidence shows that in most cases service systems are slow to be upgraded, usually as a result of capital shortages. Where systems are installed later, distribution authorities often struggle to recover their costs (Kirke,1984). An alternative approach would be to install low-cost electricity systems while the sites are being prepared. Systems

based on the use of aerial conductors, pole-mounted electrical equipment and load limiting devices are substantially cheaper than conventional systems. A part, or all, of the costs of installing these systems can be recouped when the serviced site is sold.

Another weakness of the current approach to the provision of electricity in new black townships has been the failure to make provision for the supply of electricity to homes in informal housing settlements ("squatter camps") as part of *in situ* upgrading schemes. Given the massive housing shortages that exist, most of these areas should be treated as being permanent, and upgraded. The electrification of informal housing is widely practised in developing countries around the world and presents few technical problems.

Within this context, the process whereby electrification projects in new black townships are implemented will be examined from a practical perspective.

Planning and Co-ordination

The tasks that fall into the category of planning and co-ordination of electrification projects were identified in the introduction to this chapter. In the development of new black townships, these tasks are formally the responsibility of the Community Services Departments of the four Provincial Administrations. Each of these four departments is supposed to have an electrical engineering unit that plans and co-ordinates electrification projects (Wyatt,1990). The provincial authorities undertake the development of completely new black areas, after which they are either incorporated into the area of jurisdiction of an existing BLA, or established as the area of jurisdiction of a new BLA. Thus for example, as the township Khayelitsha has grown physically, the area of jurisdiction of its BLA, the Lingelethu West City Council has also grown.

In recent years the Provincial Authorities have been subjected to the same pressures currently being exerted on all government departments to reduce the rate of increase of their annual budgets to below the rate of inflation. As a result, staff cuts have been introduced, affecting all departments. This situation has limited the capability of the provincial authorities to undertake the planning and co-ordination of electrification projects. For example, the staff complement of the

electrical engineering unit that oversees electrification projects in the entire Cape Province is consists of only 6 people: two in the Eastern Cape, one each in the Western and Northern Cape, and two in the head-office in Cape Town (Scholtz,1990). As a result, many of these tasks are ordinarily contracted out to electrical engineering consultants. Electrical planning studies and the preparation of design guidelines for the development of a new township are usually performed by private consultants.

The tasks of monitoring the overall development of the electrical network in a new township, ensuring that micro level design of new parts of the network by electrical engineers is in compliance with the macro level design guidelines, approving the plans for internal electrical systems and house wiring schemes, and liaising with funding agencies, are all also commonly contracted out to consultants. Collectively, these tasks are termed project management. The project management of all infrastructural development projects (ie. not just electricity) in Khayelitsha is being handled by a team within Bruinette, Kruger and Stoffberg (BKS) in Cape Town. BKS have also recently been appointed to project manage the development of new areas around Pietermaritzburg and in Soweto. The firm Van Wyk and Louw has a similar contract for the development of Motherwell near Port Elizabeth (Dyssel,1990).

Consulting engineers are a well established group of professionals in South Africa. The South African Association of Consulting Engineers (SAACE), a voluntary association of independent consulting engineers in private practice, has a membership of 810 engineers, representing 360 firms. These firms employ 2600 professional engineers, a total technical staff complement of 6300 and a overall staff complement of 8800 people. The value of capital works with which members of the Association were involved in the 1990 fiscal year was estimated at R5 billion (SAACE,1990:ix).

In return for their services as project managers, consultants are commonly paid an amount calculated as fixed percentage of the value of the projects that they oversee. In the case of the Khayelitsha project BKS are paid 2.5% of the value of each project (Dyssel,1990). Given that the total value of projects carried out up to the end of 1990 in Khayelitsha is estimated by Scholtz (1990) to have been R350 million, BKS have earned approximately R14 million from this contract. It is not clear whether the work involved in that task warranted a fee of such magnitude,

or whether it could have been obtained at a lower cost. Because of the substantial expertise that must be accumulated to perform this task adequately, it would not be feasible to re-appoint project managers frequently on the basis of competitive tenders.

In most situations, the project management team becomes an extension of the provincial authority's own structures. No special attempts are made by the provincial authorities to monitor the work of the project management team or to demand improved performance. In a few cases in the past, problems have arisen where project managers, who are appointed to oversee all infrastructural projects, have had little expertise in the area of electrification (Fuller & Basson,1990; Scholtz,1990).

In areas where private consultants are retained as project managers for the development of a whole township, they are responsible for monitoring the performance of other consultants involved with the design and supervision of construction of sections of the new network. In order to avoid a conflict of interest from arising, the firm employed as project managers may not be selected for the design of any projects.

Design and Supervision of Construction

The tasks involved in the design and supervision of electrification projects were described in the introduction to this chapter. In the case of electrification projects implemented in new black townships, most design and construction supervision is carried out by private electrical engineering consultants. As was pointed out, the provincial authorities are finally responsible for the infrastructural development of these areas, including the design and supervision of construction of projects, but have an extremely small staff for this purpose. As a result, they must contract out most tasks that arise from these projects. Of the 815 firms of consulting engineers (including regional and local offices of larger firms) listed in the SAACE Directory, 170 offer their services as electrical engineering consultants (SAACE,1990).

The procedures followed in the appointment of an electrical engineering consultant by the provincial authorities vary from project to project. The available

appointments are rotated amongst a list of accredited consultants who are known to have the capacity to undertake work of a particular type. There is no formal process of competition between consultants (Gaunt,1990).

Developers who are required to install internal electrical systems in houses under construction also make extensive use of electrical engineering consultants. In much the same way as the provincial authorities would use these consultants in the development of the external services and bulk supply networks, developers employ consultants to investigate, design, and supervise the construction of new electricity networks to supply these houses.

Construction

The tasks involved in the construction of new electricity systems were described in the introduction to this chapter. All construction work of systems in new black townships is done by private electrical contractors. There are approximately 4000 electrical contractors of various sizes operating in South Africa. Of these, 1916 are members of the Electrical Contractors Association of South Africa, ECA (SA). The ECA members employ close to 85% of the total labour force employed in the electrical contracting industry (Schmidt,1990:39).

Where these contractors are employed contracts are awarded by a process of competitive tendering. Notices are placed by the provincial authorities, or the project management unit on behalf of the provincial authorities, in trade journals and the press. Full design specifications are issued to prospective contractors. The contractors submit tenders detailing how they propose to complete the contract, how much time would be required, where and for how much they will purchase equipment specified in the design, and what the cost to the client would be. Although the past record of contractors will be taken into account, contracts are usually awarded to the contractor who tenders at the lowest price.

Having been awarded the contract, the contractor will proceed with the construction of the electrical system. Many of the tasks involved in the construction of these networks not especially complex, and can be accomplished by construction gangs made up largely of semi-skilled and unskilled labourers. For this reason, potential exists for the use of locally recruited labour when

installing systems in areas where unemployment is high. Payment for the construction work is made on a monthly basis. Depending on the nature of the contract a certain amount of money may be retained for a period of up to one year, in order to defray any costs that might arise from defective work done by the contractor. Once construction has been completed, the consultant is responsible for ensuring that the new system is working according to the specifications.

Developers who are required to install internal electrical systems also employ electrical contractors. In these cases the process of tendering is often less formal. Fixed business relationships may be established between particular developers and contractors.

3.3 The Electrification of New Areas Within the Areas of Supply of White Municipal Electricity Departments

Practically all existing houses and buildings in the areas of supply of white municipalities have access to electricity. As and when new areas are developed, the existing electrical networks are extended. In most older towns and cities, the number of new connections each year is not large in relation to the number of existing consumers. In Cape Town for example, the number of consumers served increased by 4 381 to 235 055 (an increase of 1.9%) during the 1988/89 financial year (Cape Town,1990a:24).

The process whereby electrification projects are implemented by white municipal electricity departments in new areas tends to follow established departmental procedures and preferences. Since they seldom face severe capital constraints, more reliable, and hence usually more expensive, systems tend to be chosen over low-cost systems. Particular equipment and technologies with which the various sections of the electricity department are familiar are usually installed in new areas.

Planning and Co-ordination

Unlike the approach adopted to the electrification of new black townships, the planning and co-ordination of electrification projects within the area of supply of white municipal electricity departments is the responsibility of the department itself. Electricity departments ordinarily have a sub-department which is specifically responsible for the planning and co-ordination of electrification projects. These units liaise with private developers, monitor the work of their own design staff and control the work of construction teams. They have annually determined budgets, which are based on predictions of the volume of work to be undertaken in the course of the following year. Most projects are initiated upon the request of private developers who require electricity services for houses being built in a new area.

Design and Supervision of Construction

The design and supervision of construction functions in electrification projects within the area of supply of white municipal electricity departments is also usually the responsibility of the department itself. Most larger departments have their own design engineers and drawing office staff, although some smaller or less established departments contract out design work to electrical engineering consultants. For example, the Durbanville municipality near Cape Town, which purchased the network which serves the town from Eskom in 1989, has minimal staff of its own for design purposes. In most cases these departments divide up the available work amongst known consultants in the area.

The design process is usually interactive: plans drafted by designers are referred to developers for comments and possible alterations. Once finality is reached, a final design specification is produced and the necessary equipment for construction of the new system is obtained.

Construction

The construction of new electrical networks within the area of supply of white municipal electricity departments is also usually done in-house. Most larger

departments have their own construction units. In some cases, separate teams are formed which specialise in medium-voltage and low-voltage system construction respectively. Some smaller or less established departments contract out construction work to electrical contractors. Tendering procedures are then used.

Upon completion of the construction of the new system, the new consumers will be connected to the existing network. At this point the new area is incorporated into the existing supply system.

3.4 The Electrification of Established Black Townships

For the purposes of this section, established black townships will taken to mean those in which a BLA has been established. In 1989 there were 260 BLAs around the country (Thornhill,1989:40). Established townships include areas of formal housing as well as areas of informal housing.

A number of formal houses in black townships already have access to electricity. An estimate of the black urban population in South Africa (excluding the "homelands") of 12.5 million people was provided in section 3.2. Of this total, approximately 7 million people live in informal houses in the backyards of formal houses and shacks in informal housing settlements, leaving only 5.5 million who live in formal houses (Financial Mail,1990b:28). Only a minority of black residents in urban areas have access to electricity. There were at least 210 000, mostly domestic electricity consumers served by BLAs at the end of 1989 (Eskom,1990b). Since only formal houses have up to now been provided with electricity, all of these consumers must live in formal houses. If six people live in each electrified house, then at least 1.3 million, or 23% of blacks in formal housing in urban areas outside of the "homelands" have access to electricity. The actual number may in fact be slightly higher, due to the poor quality of statistics available on service provision by BLAs.

A project to electrify a significant number of unelectrified houses is a large and complex operation. The Soweto project, which involved the electrification of 100 000 existing houses between 1979 and 1985, cost in the order of R200m and involved a wide range of different parties. For the purposes of that project special

consortia of consultants and contractors were established (Gervais,1987:81).

Low-cost electrical system designs are often used in the electrification of existing black areas, since the capital available is usually limited. Low cost systems allow the benefits of electrification to be spread as widely as possible. Extensive use is made of technologies such as aerial bundled conductors and pole mounted transformers. The alternative, underground reticulation systems, tend to cause more upheaval in established townships than aerial systems. For example, during the Soweto project where underground cables were installed, a number of people died by falling into trenches at night (Gervais,1987:148). Inside homes, readyboards are usually specified instead of full house wiring. In some cases these readyboards are paid for by the BLA, and remain its property after installation. Pre-payment meters are increasingly becoming standard issue in these electrification projects. Although their initial cost is higher than conventional credit meters, pre-payment meters are popular amongst BLAs and provincial authorities, since they prevent the problem of non-payment for electricity consumed.

It should be noted that due to the financial crises experienced by most BLAs, little progress is currently being made to electrify unelectrified homes, formal or informal, in existing townships.

Planning and Co-ordination

The electrification of parts of established black townships which are not electrified is formally the responsibility of that township's BLA. In practice, BLAs do not have the necessary expertise for such tasks, and depend entirely on outside assistance. The assistance of provincial authorities for planning and project co-ordination purposes is used in the Cape Province. In addition, BLAs appoint electrical engineering consultants to run all sizeable projects. Since the provincial authorities have substantial power to supply or divert bridging finances allocated to BLAs, they are able to check that expenditure at key stages in electrification projects is not unusually high. They also have the *de facto* power to approve or reject the appointment of a consultant or contractor by the BLA, and to check that systems installed comply with accepted safety standards.

Design and Supervision of Construction

During the construction stage, the consultants are responsible for supervising the construction teams. They are also ultimately responsible for ensuring that they finished system conforms with safety and other regulations.

Construction

The construction of electricity distribution networks in existing black townships is normally done by private electrical contractors, since the local authority does not have adequate staff of its own to carry out this task. Once again contractors are appointed by a process of competitive tendering. This process is overseen by the consultants. Prior to entering into a formal contract with the electrical contractor, the responsible BLA must obtain the approval of the provincial authorities.

If a project is especially large a number of different contractors are may be hired to build the new network, install the necessary equipment and do the wiring of houses.

Given that these projects take place within established townships where a substantial number of the population is unemployed or underemployed, there is usually potential for local unskilled and semi-skilled labour to be used. In some instances contractors can be required to employ only local labour. Labour intensive construction methods might also be specified in the design. Such provisions usually add marginally to the total project value, but have obvious benefits for the residents of the township itself.

Upon completion, operation and maintenance of the new system is taken over by the BLA's own electricity department.

3.5 Case Studies: Three Recent Electrification Projects in the Western Cape.

The purpose of this section is to provide case examples of recent electrification projects in the Western Cape to illustrate the previous sections. The first case study, involving 309 erven in Khayelitsha, is an example of the electrification of houses in the course of a new black township development. The second, involving 111 houses in Turfhall Park, is an example of a project to electrify a new area within the area of supply of a white municipal electricity department. The third, involving 2278 houses in Nyanga, is an example of a project to electrify existing houses in a black residential township.

The descriptions of projects that are provided here are deliberately non-technical. Particular attention is given to identifying the institutions responsible for particular aspects of these projects and their interaction with each other.

3.5.1 The Electrification of Khayelitsha Town 2 Village 3

Khayelitsha is a very large black township on the Cape Flats, east of Cape Town. The local authority responsible for providing electricity to established parts of the township is the Lingelethu West City Council. The provision of electricity by its Electrical Department was described in section 2.9.2. The authority responsible for the electrification of new areas, prior to their inclusion in the area of jurisdiction of the council, is the Cape Provincial Administration (CPA).

Planning and Co-ordination

In 1984, when the development of infrastructural systems to serve Khayelitsha were being planned, a set of macro level design guidelines for the electrification of the township were drawn up. This task was carried out by VDM Consultants, a consortium of two firms of consulting electrical engineers, Van Niekerk, Kleyn and Edwards (VKE), and De Villiers and Moore (Scholtz,1990).

Whilst the design guidelines made provision for the eventual complete electrification of the entire township, they also specified that only limited low-voltage ("phase one") systems would be installed to houses at the time of their construction. As a result, only non-residential sites in the first block of council-owned housing that was constructed, in Khayelitsha Town 1 Village 1 & 2, were electrified. Houses in this area have been without electricity to this day. Khayelitsha has since grown enormously, mostly as a result of the settlement of two very large informal housing areas, known as Site B and Site C. Between 1985 and 1989 new formal houses were developed in a number of areas. Most were electrified. Since then, a drop in demand for such homes has led to the stagnation of the electrification the township. A number of site and service development schemes organised by the CPA are currently under way. Once again, electricity is not being provided to houses in these areas (Loots,1990).

In 1986 a team of private engineering consultants at the firm Bruinette, Kruger and Stoffberg (BKS) were appointed to take over the co-ordination of all infrastructural development projects in Khayelitsha. This step was necessitated by the fact that the staff of the CPA (then still the Western Cape Development Board) were unable to continue to handle a project of such magnitude. As was noted elsewhere, BKS is paid a fee of 2,5% of the total value of all contracts handled for fulfilling these tasks.

This case study examines the electrification of 309 erven being developed by Bester Homes (Pty) Ltd. in May 1989. All planning and co-ordination functions were carried out by BKS, with the occasional involvement of the CPA.

The area that will be examined here, Khayelitsha Town 2 Village 3, was one of the formal housing areas developed in the period mentioned above. When this project began in 1989, the design guidelines for Khayelitsha had been revised, and specified that the low-voltage distribution system should be underground, and that pre-payment meters should be installed inside the houses. High mast area lights had been installed in a previous project. All technical information presented here is drawn from DeVilliers and Moore (1989a).

Design and Supervision of Construction

In April 1989, Bester Homes commissioned De Villiers and Moore, a Durbanville-based firm of electrical engineering consultants, to prepare a specification for an electricity system to serve these erven, using the design guidelines provided by the provincial authorities. Because of the financial problems being experienced by the Lingelethu West City Council at the time, the developers had been informed that they would be required to install and pay for internal service systems right up to the nearest point of medium-voltage supply at 11kV.

A design specification was produced which provided details of the required extensions to the 11kV network in the area, and the necessary arrangement of mini-substations and low-voltage cables. Since the other civil service systems such as water and sewerage networks had already been installed in trenches in the road reserves, special attention was given in the specification to the need to avoid damaging these systems while installing the electrical network.

The service connections into the houses ran underground and were terminated at a pre-payment meter. Angcontech (Pty) Ltd "Minicon" pre-payment meters were installed. The houses were fully wired with plug points in each room and light fixtures in the ceilings. The houses had neither geysers nor three-phase stove points.

A cost estimate for the project was provided by the consultant, based on rates for material and labour that had been received on recently submitted tenders for similar projects. An allowance of 1,5% per month was made for cost escalations prior to and during the project. The estimated costs included 13% general sales tax and allowances for professional services of 10% of the value of the project. An allowance was made for the employment of a Clerk of Works, given that the contractor would be required to work to a tight time schedule in an area already supplied with other civil services.

The estimated cost breakdown, in Rands, was as follows:

Mini-substations	93 500
Underground reticulation	233 470

Service connections	50 740
Earthing	10 760
Preliminary and general items	11 000
Net Present Value of Works (April 13, 1989)	**399 470**
Contingencies (10%)	39 950
Subtotal:	**439 420**
Escalation (until September 1989)	32 960
Subtotal:	**472 380**
Professional Fees (10%)	47 850
Clerk of works	16 000
ESTIMATED FINAL COST:	**R536 230**

The estimated cost per stand (excluding cost of meters and house wiring) was therefore R1735. All of these costs were passed on to the home buyers by the developers. The Lingelethu West Town Council was not in a position to obtain loan capital to finance the scheme.

This information, as well as a copy of the detailed design specification, construction drawings and draft contract, was conveyed to the CPA on March 13, 1989, in order to obtain their approval for the project.

Construction

Since Bester Homes were not able to install the electrical network themselves, tenders for the construction contract were invited through the press on April 11, 1989. After considering the tenders submitted, the consultants advised Bester Homes to award the contract to Racec (Pty) Ltd., an electrical contractor based in Epping. The contract was signed on April 28, 1989. Construction commenced in May 1989. The houses were sold in the course of 1989, for around R25 000 each.

Conclusions

Operation and maintenance of the system was taken over by the Lingelethu West City Council Electrical Department. Consumers purchase electricity from a number of sales points in the area. The tariff in 1990 was 15c/kWh. Apart from problems with a number of the pre-payment meters, the system has operated satisfactorily since then. Average consumption over the year since their connection has however been very low, in the order of 120 kWh per month (Scholtz,1990). More recent information from the Lingelethu West City Council Electrical Department suggests that the consumption of consumers in the Town 2 Village 3 area has risen slowly in 1990 (van der Westhuizen,1990). Income from the 309 houses for the Council at 150 kWh per month and at a tariff level of 15c/kWh would be approximately R7000 per month.

In conclusion, it can be said that this project proceeded quickly and effectively, resulting in few problems being experienced by any of the parties involved. However, the electrification of these houses added an amount of R1735 to the cost of the houses, plus the cost of the house wiring and the pre-payment meter (perhaps another R600). Due to the financial problems of the Lingelethu West City Council, electricity provision in new houses resulted in high costs being passed on to first-time home buyers. Despite the fact that these consumers had already paid for their own electrical network (up to the medium-voltage 11 kV point), they were charged a tariff of 15c/kWh. The comparable tariff charged by the City of Cape Town Electricity Department at the time was 10.5c/kWh (Mickeleit,1990).

3.5.2 The Electrification of Turfhall Park

Turfhall Park is a coloured residential area between Wynberg and Mitchells Plain, within the area of supply of the City of Cape Town electricity department. The provision of electricity by this department was described in detail in section 2.9.1. The area was developed by private developers, who constructed fully electrified houses for resale to the public. This case study describes the electrification of 111 erven in the area, between 1988 and 1990. All technical information provided is drawn from Cape Town (1990d).

Planning and Co-ordination

The planning and co-ordination of all electrification projects undertaken by the City of Cape Town electricity department is handled by its Development Department, located in the Civic Centre in Cape Town. The Department operates a computerised system in order to co-ordinate the correspondence that arises from electrification projects, and to process internal works orders which arise from particular projects.

In this case, the developers of the Turfhall Park area first contacted the Mitchells Plain District office of the electricity department with a request for the installation of an electrical system on November 7, 1987. A layout of the proposed township was provided. This information was passed on to the Development Department in Cape Town, from where the project was co-ordinated until its eventual completion in June 1990.

Design and Supervision of Construction

All design and drawing work done by the City of Cape Town electricity department is handled in-house. The Development Department had a design and drawing-office staff complement of approximately 50 people at it disposal in 1988 (Cape Town,1989).

The first design specification for this project was produced, and plans prepared,

between December 1987 and March 1988. On April 26, 1988, a new township layout was received from the developer. At this point, the project was apparently put on hold for about one year.

The Development Department eventually issued a revised layout plan on September 27, 1989. The design specified a standard underground distribution system which was common to all new areas electrified by the department at the time. Conventional credit meters were placed near the boundary of each stand.

Although no records are kept which would indicate the total value of this project, or of the cost per electrified stand, average figures for new areas electrified by the department are available. The average cost per stand, based on capital expenditure of approximately R10 million for the 1988/89 financial year and 4 381 new connections for that period, was R2 283 per stand. Thus, the value of the Turfhall Park project was probably in the region of R250 000.

A guarantee agreement was entered into between the City and the developer on November 2, 1989. These agreements are entered into in all such cases. According to the scheme applied at the time, the developer agreed to pay difference to the City if the houses in the area supplied did not consume electricity to the value of 20% of the capital cost of the project every year for five years. As a rough guide to the conditions imposed by this scheme, using the total cost estimate of R250 000 provided above, and an average electricity tariff of 10c/kWh, this condition would be met if each house used approximately R38 worth of electricity (380 units) each month. Since the average consumption of domestic consumers served by the department in 1989 was 612 kWh, these conditions are not very stringent (Cape Town,1990c). The workings of schemes of this sort are described in more detail in section 4.2.

Between October 1989 and March 1990 the Mitchells Plain District office prepared itself for the construction of the system. Works orders were issued and the necessary equipment was assembled.

Construction

Construction of new systems by the electricity department are carried out in-house, by Distribution Department teams. There are two separate units, a mains section which builds networks and lays cables, and a substation section which constructs only substations. The total staff complement of the Distribution Department of the department was 857 people at the end of 1989, 34% of the total staff complement of the electricity department of 2 553 people (Cape Town,1989).

Construction of this project began on March 21, 1990. Cable laying was completed by April 12, 1990. Installation of a new substation was completed on June 4, 1990. The system was put into operation on June 28, 1990.

Conclusions

From start to finish this project took a two and half years to complete. It was closely co-ordinated by the Development Department. It is clear from the details of the guarantee scheme used that the installation of electricity systems in this area did not result in high costs being passed on by developers to the home buyers. As noted elsewhere, this is due to the fact that the distribution authority responsible for the project was able to easily bear these costs, given its good financial position.

3.5.3 The Electrification of Nyanga

Nyanga is a black residential township on the Cape Flats, south-east of Cape Town. The housing in the area includes formal houses, shacks on the properties of formal houses, and informal housing settlements in a number of previously open areas. Together with Gugulethu, KTC, Philippi, New Crossroads (also known as Nyanga 2) and Langa it makes up the area of jurisdiction of the Ikapa Town Council. The elected Town Council has become defunct, although the administrative structures of the Council still operate. The council has a Town Engineer, but has no electrical engineering staff. The civic organisation in the

area, the Nyanga East Civic Association, is said to enjoy considerable support of residents in the area.

Since the Town Council has no electricity department, Eskom had operated as the supply authority in Nyanga prior to the electrification project that will be described. Limited electricity services were supplied to some 430 consumers including schools, community facilities, a police station and approximately 230 domestic consumers. Many domestic consumers had fallen into arrears with payment on their accounts. Many street lights in the area had been broken. High mast area lights were installed in the course of 1989. All technical information presented here is drawn from DeVilliers and Moore (1989b).

Planning and Co-ordination

The Ikapa Town Council, with the approval of the CPA, commissioned De Villiers and Moore to produce a feasibility study on the full electrification of Nyanga in late 1988. On the basis of this study the Council applied to the Western Cape Regional Services Council (RSC) for funding of the project. The RSC granted R4 055 600 for the project at the start of 1989. De Villiers and Moore were requested to proceed with the design and preparation of tender documents for the electrification of Nyanga on March 13, 1989. Whilst the Council was formally responsible for this project, the consultants were given the responsibility of carrying out almost all aspects of the project. The CPA were involved only at the level of checking and approving the design and the contracts entered into by the Council.

Design and Supervision of Construction

In order to produce the design specification, the consultants met a number of times with representatives of the Post Office and of Eskom. This was necessary to prevent disruption in the provision of existing services in the course of the electrification project. The consultants completed this task by October 31, 1989. The design produced made provision for the electrification of 2278 residential sites, and a number of non-residential sites. No provision was made for the electrification of informal houses, either in the backyards of formal houses or the

shack settlements. The report suggested that the network could be extended to provide electricity to these residents some time in the future.

The consultant's detailed design included plans for the extension of the existing medium-voltage (11 kV) network, 3 mini-substations, 32 pole-mounted substations, an extensive low-voltage network of aerial bundle conductors, underground and overhead service connections, and readyboards in lieu of house wiring. The readyboards were equipped with an integral 20 amp circuit breaker, an earth leakage unit, 3 switched plug sockets, a lamp holder with a lamp and a light switch. Pre-payment meters were included in the design, but not included in the contract specifications. It was intended that separate tenders be called for these meters, in conjunction with Eskom.

A meeting was held with the Nyanga East Civic Association in October 1989, prior to the completion of the design process, at which the CPA and the consultant presented the details of the project. A second meeting was held in May 1990 at which members of the civic organisation raised a number of problems about the system to be installed, particularly with the idea of pre-payment meters. These reservations were resolved after further discussions were held (Scholtz,1990).

A cost estimate for the project was provided, based on rates for material and labour that had been received on recently submitted tenders for similar projects. An allowance of 1,75% per month was made cost escalations prior to and during the project. The estimated costs included 13% general sales tax and allowances for professional fees according to the standard SAACE fee scales. An allowance was made for the employment of a Clerk of Works, given that the contractor would be required to work in an area already supplied with other civil services.

The estimated cost breakdown was as follows:

Substations	663 200
Underground reticulation	181 900
Overhead networks	870 100
Service connections and "readyboards"	1 300 900
Earthing	96 000

Preliminary and general items (5%)	155 600
Net Present Value of Works (October,1989)	**3 267 700**
Contingencies (10%)	326 800
Subtotal:	**3 594 500**
Escalation (until November,1990)	503 200
Subtotal:	**4 097 700**
Professional Fees	320 000
Clerk of works	50 000
ESTIMATED FINAL COST:	**R4 467 700**

This amount was 10.2% more than the amount of R4 055 600 allocated by the RSC for the project. Further negotiations with the RSC led to the extra amount being allocated from the following year's RSC budget.

The cost estimate for the pre-payment meters was as follows:

2 278 pre-payment meters at R441 each	1 004 598
Point of sale equipment (card dispensing system)	30 000
TOTAL (no escalation)	**R 1 034 598**

The estimated cost per stand (including meters and readyboards) was therefore R2 415.

Tenders were invited for the supply of 2278 pre-payment meters and four Card Dispensing Units was issued in May 1989. The contract was awarded in June 1989 to Conlog (Pty) Ltd. The unit cost of the Conlog "E-kard" meters was approximately R 440, and the total value of the purchase was R 1 044 598. These meters were paid for by an internal loan from the Ikapa Capital Development Fund, repayable at a 12% interest rate over 20 years. The total loan commitment that resulted from this project was therefore R 5 512 298.

Construction

After approval was obtained from the CPA a process of inviting tenders for the construction contract was carried out. All experienced electrical contractors were invited to submit tenders. The proposed contract followed the standard SAACE format, except for the special proviso that the contractor employ and train local labour in the course of the project.

The tender was awarded on January 15, 1990 to Electro Networks (Pty) Ltd, a subsidiary of Concor. Construction commenced in March 1990. The estimated time of construction was 11 months. Early time losses were incurred as a result of delays in obtaining equipment. The completion date of the project was re-scheduled to May 1991.

At the time of writing (April 1991), the first customer connections had just been made.

Conclusions

It is not clear who will eventually be responsible for the operation of the system that is under construction (ie. who will be the distribution authority). The legally entitled authority, the Ikapa Town Council, has no electricity department. The CPA have attempted to persuade the City of Cape Town electricity department

to take over the system when completed. Their initial reaction was not entirely positive. The overhead bundle conductor system used, and the pre-payment meters are unfamiliar to the department. Also, they are hesitant about committing themselves to repaying the loans taken out to build the system. What is more, the department would also be required to purchase parts of the older network in the area from Eskom, which is valued at R 607 000. Unless the matter is resolved, Eskom, who are still nominally the supply authority to Nyanga, may by default continue to serve the area.

From start to finish this project took just over two years to complete. The project was tightly controlled by the consultant. The fact that local labour was used in construction was a positive initiative, as was the fact that low-cost technologies were used. However, the fact that informal houses in the area were not electrified was unfortunate.

3.6 Conclusion

This chapter has described the ways in which electrification projects are currently carried out in different urban areas of the country. A few important conclusions can be drawn from these observations. Firstly, while electrification projects have been carried out in most areas, efforts to electrify all homes in South Africa have probably slowed down more recently. This has been as a result of saturation of electrification in the areas of supply of white municipalities, the financial problems experienced by BLAs, and the inappropriate planning methods supported by the state up to now. There is therefore a blockage in the electrification of black urban areas, caused primarily by institutional and financial problems.

Secondly, considerable planning, design and construction expertise exists in South Africa which can be used to carry out a more determined electrification effort in the future. This expertise is located within the public sector, notably in white municipal electricity departments, and in the private sector, notably amongst consulting electrical engineers and electrical contractors.

Thirdly, the fragmented structure of the distribution sector of the ESI has led to

a situation where different connection charges, service charges and energy charges are passed on to consumers in different areas. In general higher costs are passed on to consumers in black areas, since BLAs attempt to pass on capital costs to home buyers.

In chapter six, specific attention will be given to determining appropriate roles for public sector and private sector institutions in electrification projects in the future.

CHAPTER FOUR

THE FINANCING OF ELECTRIFICATION PROJECTS IN URBAN AREAS OF SOUTH AFRICA

4.1 Introduction

The aim of this chapter is to describe the ways in which electricity distribution authorities in urban areas finance electrification projects. Substantial amounts of capital must be invested in order to extend a distribution network into a new area. During the course of such projects money is expended on equipment; the salaries and wages of people involved in planning, design and construction; professional fees; and a range of other costs. These monies are recouped, wholly or in part, from the sale of electrified houses or sites, and from the sale of electricity to new consumers.

The electrification of new areas usually necessitates the uprating of parts of the general bulk supply system. As a result, distribution authorities also invest in the ongoing uprating of existing networks, in order to meet growing total demand for electricity. For example, the City of Cape Town electricity department spent approximately R10 million in order to connect 4 381 new consumers in the 1988/89 financial year. Of that total, approximately 7 million was for purchasing high- and low voltage cable and street furniture, and for labour charges. The remaining R3 million was spent on the provision of transformers, mini-substations and medium-voltage switchgear needed elsewhere on the system (Cape Town,1990a:15).

Electricity supply industries usually consume substantial portions of the total capital invested in developing countries. In a number of developing countries examined in a World Bank study, investment in the energy sector accounted for over 40% of annual total public investment. Much of this investment was for new generating capacity, but the investment in distribution networks was also significant. Thus, the annual average growth rate of connections between 1968 and 1982 for a group of 29 developing countries was 9% while the average annual

per capita growth rate of their economies was only 2%. Even in countries with little or negative economic growth, the majority had more than 3% annual growth in connections (Munasinghe,1989:103).

As was noted in chapter three, the number of domestic consumers of electricity in South Africa may have increased by about 160 000 per year between 1985 and 1989 (Eskom,1987 and Eskom,1990b). As was noted in chapter three, this figure is probably too high since it also reflects the fact that statistics on electricity provision in urban areas were becoming more comprehensive. Whatever the actual number of new connections, it can be assumed as a first estimate that this was carried out an average cost of R2000 per new connection. Thus the total spent may have been as high as R320 million per year. Dingley (1990:22) has estimated that it would cost in the region of R700 million per year, for twenty years, in order to supply electricity to all potential users in South Africa.

The capital used by distribution authorities to finance electrification projects is obtained from two sources. The first source is contributions from property developers, who may be required to pay for the costs of the internal services in a new housing area, including the low-voltage electrical network. The section of this chapter which follows this introduction describes this process in some detail.

The second source of capital for distribution authorities is long-term loans. Loans are raised to pay for the necessary development, then repaid over a long period with revenues from sales of electricity. Electrification projects are well suited to being financed by long-term loans. The capital requirements of such projects are large and usually beyond the capability of the supply authority to finance from annually retained income. Also, the design life of an electrical network, if properly maintained, is ordinarily longer than 20 years, which is the usual loan period.

Long-term loan finance for electrification projects is currently available from a number of sources. These include local authority capital development funds; Regional Services Councils funds; and state-sponsored development funds, including the National Housing Fund, the Loan Fund for Local Authorities, and the Development Bank of Southern Africa. In this chapter each of these funding sources will be described in some detail. Although they currently do not provide loans for electrification projects in South Africa, the potential role of international

development funds such as the World Bank in electrification projects in South Africa is also examined in a short section. The institutional form and goals of each will be discussed, and their contribution to electrification of urban areas will be described.

It should be noted that the capital expenditure needs for infrastructural development in white and in black residential areas are very different. The electricity networks operated by white municipal distribution authorities have grown slowly and have been paid for over a long period. In most cases the number of consumers that they serve is growing comparatively slowly. For this reason their financing requirements for system extension are comparatively low in relation to their revenues from electricity sales. In contrast, the financial position of Black Local Authorities (BLAs) distribution authorities is very much worse. As a result of the backlogs in spending on electrical infrastructure, these systems are only now being extended. The capital requirements of such distribution authorities is thus very high in relation to their revenue from electricity sales. For example, the ratio of annual capital expenditure on new connections to annual revenue from sales of the City of Cape Town in the 1988/89 financial year was R10 million to R355 million, or 1 to 35.5 (Cape Town,1990a). The Lingelethu West City Council, where new connections were being made very rapidly between 1986 and 1989, probably had a ratio of approximately R12 million to only R3 million, or 1 to 0.25 (van der Westhuizen,1990). It is understandable from these statistics that BLAs have found it extremely difficult to sustain repayments on capital loaned, whilst white municipalities have found this relatively easy.

The cost of capital, as indicated by the interest rate payable by the borrower, is of great importance to distribution authorities. If electricity tariffs are to be held at acceptable levels, the revenue generating ability of a group of consumers, and hence the distribution authority, is limited. Electrification projects can only be undertaken if the distribution authority is able to meet interest and redemption payments arising from the debt that it must incur in order to install a new system. Since electricity provision is capital intensive, the cost of capital available is often the determining factor as to whether a project will or will not be financially viable. Not all capital available to distribution authorities is priced equally. Ordinarily one can distinguish between capital available from commercial capital markets and concessionary capital that is available from state-supported funds.

4.2 Contributions from Developers for Internal Service Systems

As was explained in previous chapters, a contribution to the financing of electrification projects may be required from developers who are constructing formal houses for resale to the public. The installation of a new electrical system involves the construction of a new medium-voltage bulk supply system and a low-voltage network. According to convention, a distinction will be drawn between the internal service system, which is dedicated to the houses that fall within the group of properties being developed, and the external service system, which serves a number of different areas. Provincial ordinances give local authorities the power to define what constitutes the internal service system. As a result of their different financial situations, different standards are applied by different distribution authorities. Also, different rules are applied as to what part of these systems the developer is liable for. In some instances the developer must pay for and construct a substantial portion of the network. In other cases the distribution authority pays for and constructs the system.

Well established white municipal electricity departments, such as the City of Cape Town electricity department, pay for and install the entire system, including the internal service system. The developer is responsible for only the service connection running from the boundary of the stand to the house, and the house wiring installation. Since the rate of growth in connections of these departments is low relative to the number of existing consumers, it is possible for this expenditure to be borne in the capital budget of the department, and financed in the normal way. A relatively small portion of the tariffs charged to all consumers, new and existing, is spent each year on servicing loans raised for this purpose (Hyde,1990). Some of these departments use the concept of the internal service system in order to apply a "guarantee scheme". In terms of these schemes, the developer and the distribution authority enter into an agreement that sales to the new area each year, for five years, must equal 20% of the total capital cost to the local authority of the internal service system installed. In a year when the sales are below the required figure, the developer must pay in the difference. In years when the sales exceed the required figure, the local authority will re-imburse the developer (Hyde,1990). In this way the distribution authority is certain that the

costs incurred in supplying the new area are recouped. As was pointed out in the case study on the electrification of Turfhall Park by the City of Cape Town electricity department in section 3.5.2, this guarantee is not very stringent in the areas of supply of white municipal electricity departments. The condition of 20% of costs in sales each year is met if each household consumes about 380 kWh of electricity each month. The average monthly consumption by domestic consumers in 1988/89 in the City of Cape Town electricity department area of supply was 612 kWh (Cape Town,1990c).

Other schemes require only that the developer provide bridging finance for the distribution authority whilst the internal service system is under construction. An example is the scheme adopted in Port Elizabeth. The developer pays for the installation of that part of the system as it is constructed, but receives half of this money back once one-third of the houses have been connected to the grid and the other half back when the final two-thirds of the houses have been connected (Adams and Gwilt,1990).

In the case of more rapidly growing white municipalities, which are nonetheless financially viable, a scheme is applied which is based upon the stabilization of tariffs at acceptable levels. For example, in the scheme applied by the Randburg City Council, a calculation is carried out to determine the component of the electricity tariff it charges which is required to service its loan requirements. When a new area is electrified, the total loan requirements of the distribution authority will rise by the cost of the new system. There will also be a new set of consumers to help service that loan debt through their electricity payments. If the tariff charged to the new consumers is to be the same as that charged to old consumers, and the tariff is not to be increased, then that portion of the new capital costs which exceeds the overall costs borne by all consumers, must be borne by the developer. In effect, in this scheme, the electrification of a new area must neither benefit, nor disadvantage the existing financial strength of the electricity department (Clarke,1990).

As a result of the financial crises which face most BLAs, very different schemes are applied in new housing developments in black townships. Since most BLAs are not financially viable they are not in a position to repay loans obtained for new electrification projects. Also, most have a very large debt burden in relation to their revenue base. As a result of these problems their access to new capital

is limited. In order to avoid incurring more debt, BLAs try to pass on as great a portion of the costs of a new system to the developer as possible. In most cases developers will be required to design, construct and pay for the internal service system. What is more, the internal service system is defined so as to include as many parts of the electrical network as possible. Such a situation exists in Khayelitsha, according to the scheme applied by the Lingelethu West City Council.

The problem with this practice is that it inflates the cost of the housing being developed. Developers are in most cases private companies who make a profit from the construction and resale of houses. As a result, they merely provide bridging finance for these services to be installed, since they will invariably recover their full costs from those who purchase the houses. The end result is that the new residents pay for the entire installation with the bonds which they obtain from building societies, and the houses are therefore less affordable. Thus, in the case study of the electrification of Khayelitsha Town 2 Village 3 in section 3.5.1, an amount of R1 735 was added to the cost of each house constructed by a private developer. By comparison, in the example of Turfhall Park mentioned above, an estimated cost of R2 283 per stand was borne by the City of Cape Town. Thus, the cost of housing in poorer, black townships areas has been inflated, while the cost of housing in wealthier areas has not. This has contributed to the fact that formal houses are not affordable to more than 10% of township residents at current income levels of black South Africans in urban areas (Financial Mail,1990b:28).

Since contributions from developers (ie. home buyers) to electrification projects reduce the loan commitments that the distribution authority must incur, these amounts are properly included in a consideration of the sources of finance for electrification projects. It is very difficult to determine the amount currently contributed per annum by developers to electrification projects in all urban areas. In the township of Khayelitsha alone, developers have probably paid for the internal services to about 3 000 houses, which amounts to around R5 million, over the last five years if the figure of R1 735 per stand is used (Scholtz,1990). During the same period about R35 million was spent by the provincial authorities on behalf of the Lingelethu West City Council on developing the bulk electrical system and the supply to non-residential users (Scholtz,1990).

In conclusion, the contribution of developers to electrification projects in urban areas varies depending on the financial situation of the distribution authority that serves the area in question. It is not possible to estimate the average annual contributions to urban electrification from this source.

4.3 Local Authority Capital Funds

Local authority capital funds are internal funds from which capital expenditure may be financed. They are wholly owned by local authorities and are operated by the city or town treasurer's department. There are commonly two types of local authority capital funds. The first type, known as known as Capital Development Funds (CDFs), hold accumulated reserves or local authority savings. The second type of funds are Loan Funds (LFs) which hold funds raised from outside sources. Each of these types of funds will be described in the sections which follow.

CDFs are set up to hold local authority savings. The provincial ordinances which govern white municipalities prescribe that they should establish CDFs. A portion of each municipality's annual operating revenue must be saved in a CDF. In the Transvaal, for example, the relevant ordinance specifies that an annual contribution of 1% of the previous year's total operating revenue should be deposited in a CDF (City Council of Pretoria,1990:8). These funds are then used to finance capital development projects. Rather than borrowing from an external source for an electrification project, an electricity department within a local authority can be granted an advance from a CDF. The monies advanced are repayable at a set interest rate. In this way the holdings of the fund accumulate over time. Repayments to the fund appear on the annual operating budgets and accounts of the municipal departments that borrow from the fund.

In the Transvaal, the relevant provincial ordinance prescribes that the interest rate at which loans should be issued from CDFs will be equal to that of the Local Authorities Loan Fund, which will be described in section 4.5.2 (City Council of Pretoria,1990:9).

Few Black Local Authorities have CDFs, nor are they specifically prescribed in

terms of the BLA Act. Most BLAs have not yet reached a point where they can break even, let alone save a portion of their annual operating income for the establishment of reserve funds. As a result, they are dependant on external financial sources for their loan requirements.

By accumulating CDFs local authorities reduce their external borrowing requirements and are therefore less susceptible to interest rate fluctuations on outside capital markets. Also, the cost of capital obtained from internal sources is generally lower than from outside sources since private investors on capital markets usually demand a higher return on their investment than the rate at which a local authority expects on its own CDF to accumulate.

It is difficult to determine the total value of electrification projects in urban areas that are financed from CDFs in this way. Statistics provided in the 1989 Official South African Municipal Yearbook on the financial performance of electricity distribution authorities show how much each department spent in the previous financial year on capital charges arising from debt, but do not indicate the extent of that debt or by how much it changes each year. It is thus not possible to speculate on how much is contributed to electrification projects on average each year from this source.

The second type of local authority capital funds mentioned above are Loan Funds (LFs). Unlike CDFs which hold internally accumulated savings, LFs are funds set up within city or town treasuries to hold capital obtained from outside sources. These outside sources are the state-sponsored funds that are described later in this chapter, and capital markets. Only the latter, that is funds obtained directly from capital markets, will be described in this section.

White municipalities are empowered by their governing provincial ordinances to raise loans on capital markets by issuing stocks, debentures and bills to the public. These loans may only be raised with the permission of the Administrator, and the total indebtedness of a municipality may not exceed a limit set in the ordinances. In the Cape Province, the total indebtedness of municipalities may not exceed one-sixth of the value of the rateable property in the municipal area. The ordinances prescribe that the capital raised in this way shall only be used for the acquisition, preservation or improvement of municipal assets. Black local

authorities are also entitled by the BLA Act to raise loans from outside sources, with the prior approval of the administrator.

The listings of fixed interest bearing South African Government Bonds provided in the Johannesburg Stock Exchange Handbook of January 1990, indicates that 33 of the larger white municipalities around the country have outstanding bond issues, with a total value of around R1.9 billion. It would also appear from this source that no BLA has yet issued bonds on open capital markets (The Stock Exchange Handbook,1990:324).

The most common financial instruments used by municipalities are long-term fixed-interest bonds. These bonds pay a fixed annual amount of interest, and are redeemed in full after the expiry date of the bond is reached. The interest rates payable on these bonds varies, but is commonly lower than the interest payable by private companies who issue similar term bonds. The fact that municipal bonds are guaranteed by the Administrator of each province lowers the risk associated with holding these bonds, and brings down the interest rate that needs to be offered to prospective investors.

It is difficult to determine the extent of the annual contribution of capital market borrowings to electrification projects in urban areas. It is usual for general development funds to allocate about 10% of their funds to electrification projects. Thus, perhaps 10% of the R1.9 billion of registered municipal debt, or R190 million, has been used for electrification projects. Since the average period after which municipal bonds are repayable is about 20 years, the average rate at which new debt is undertaken for electrification is perhaps about R10 million per year.

Once raised, the holdings of LFs may be amalgamated with the holdings of CDFs to form Consolidated Capital Development and Loan Funds (CCDLFs). They are then used by different departments in the same way that funds in CDFs are disbursed and repaid.

In conclusion, local authority capital funds are used mainly by the treasuries of larger white municipalities to finance electrification projects by two means. The first is by accumulating financial reserves in CDFs to advance to their electricity departments as low interest loans. The second is to raise loans from outside sources, capital markets and state supported funds, as LFs, also to advance to

their electricity departments. This second means of financing accounts for about R10 million spent on electrification each year.

4.4 Regional Services Council Funds

Regional Services Councils (RSCs) were created in July 1985 with the promulgation of the Regional Services Councils Act (Act 109 of 1985). As was pointed out in section 2.5, RSCs were designed to fulfil a number of different tasks. Apart from the Cape Province, where they have replaced divisional councils, the only meaningful role that they have played has been to finance development projects within their regions of jurisdiction. RSCs are themselves funded by two forms of taxation on businesses in their regions. These are levies calculated as a set percentage of their turnover and their staff payrolls.

RSCs lend the funds that they collect to the local authorities which fall within their regions. Although white municipalities numerically dominate the Councils which meet to allocate such funds, as previously explained, the bulk of the funds at their disposal are allocated for use in black townships. RSC loans are generally provided at a 2% interest rate and are repayable over 25 years (Veldsman,1990). Loans are usually issued for projects to develop bulk infrastructural systems. Thus, projects to develop low-voltage reticulation systems to connect new domestic consumers are unlikely to be funded. Nonetheless, the fact that the Western Cape RSC funded the electrification of 2 278 houses in Nyanga at a cost of about R4.5 million, as described in section 3.5.3, indicates that this rule has not always been strictly applied.

Data on the total amounts collected and allocated by RSCs for electrification projects is not readily available. Assessment of the information provided is also complicated by the RSC system of allocating expected revenues before they are collected. The Western Cape RSC allocated R127 million for all infrastructural development in the 1988/89 financial year. Transvaal RSC's provided R674 million for township infrastructural upgrading in the 1989/90 financial year. (Urban Focus,1990a:6). The Central Wits RSC alone allocated R167 million for black townships in that year (Urban Focus,1990b:9). No information is available which shows the portion of these monies set aside for electrification projects.

As was noted in section 2.4, the financial collapse of BLAs in the Transvaal and OFS, and the exhaustion of Provincial Administration bridging finance budgets in these two provinces has prompted a change in the way that RSC funds are applied there. In both cases RSC funds are now being used to cover BLA budget deficits. Thus, infrastructural development in these areas has been shelved (Marais,1991).

As was pointed out in section 2.5, RSCs were structured to complement the system of racially segregated local authorities which evolved in urban areas in the 1980's. Thus, whilst they have played a useful role in financing a few development projects, they will ultimately need to be restructured to allow for the formation of non-racial local government structures. Some of their administrative and development duties are likely to be taken over by such structures in the future. The system of collecting revenues from local businesses may or may not be retained within such a scenario.

In conclusion, RSCs have played a useful, if limited, role in financing electrification projects in urban areas. In the Transvaal and OFS they no longer play this role due to the collapse of BLAs and the system of provincial bridging finance. It is not possible to estimate the average annual financial contribution to urban electrification projects from this source.

4.5 State-sponsored Development Funds

The formation of state-sponsored development funds has been a central component of the approach of the South African government to the financing of infrastructural development in urban areas. According to this approach, racially segregated local authorities, assisted by the provincial authorities in some instances, are loaned capital from centralised funds for development purposes. These loans are issued for capital development only and are therefore repayable at interest rates set by the state. Local authorities are supposed to repay these loans from revenues collected from the homes, businesses and industries to which they provide services. Thus a principle of cost recovery in infrastructural spending is applied.

The institutional form taken on by these funds is usually that of non-profit public investment corporations. Their existence and operation are prescribed by the acts of Parliament by which they are established. They are run by boards or by trustees whose composition is determined by those acts. They are usually exempt from taxation. Apart from receiving grants or loans from the central state through the annual national budget, they are usually empowered to raise loans on capital markets by issuing bonds and other financial instruments. The central treasury normally guarantees their bond issues.

It should be mentioned at the outset that this approach to infrastructural development, whilst perhaps appropriate to assisting white municipalities, has failed to enable BLAs to effectively develop infrastructures in their areas of jurisdiction. The reasons for this failure were described in some detail in section 2.4. Simply put, the backlogs in development spending in black townships exceed the resources currently being allocated by the government for such purposes. Also, the financial crises experienced by BLAs has limited their ability to repay development loans, and has thus invalidated the principle of cost recovery.

Capital for electrification projects in urban areas is currently channelled through three state-sponsored development funds, each of which will be described here in turn: the National Housing Fund, the Loan Fund for Local Authorities, and the Development Bank of Southern Africa.

4.5.1 The National Housing Fund

The National Housing Fund was established in terms of the Housing Act of 1957, to finance the development of urban areas in South Africa. It is the primary source from which the development of black townships has been funded in the 1980's. Loans are issued from the fund to local authorities for all development projects, including electrification. These loans are re-payable over 20 years at an annually adjusted interest rate. In 1990 the prevailing rate was 11,25% (Scholtz,1990). The fund itself is merely a holding account to which a number of different state structures have access. The accounting functions required to control the expenditure and income of the fund are carried out by the Department of Public Works and Land Affairs (South Africa,1990b).

The fund has two sources of income. Firstly, the fund receives fresh amounts of capital each year, via a number of different Parliamentary budget votes. Each of the "own" affairs administrations in the tricameral Parliament (Houses of Assembly, Representatives and Delegates) are allocated an amount which is deposited in the National Housing Fund. Two further allocations, for "blacks outside self-governing territories" and for "blacks inside self-governing territories" (ie. those living in the non-independent "homelands") are allocated amounts which are determined by the Department of Finance. These amounts are also held in the National Housing Fund.

The budget votes to the various bodies for the 1989/90 year were the following:

Whites	10 million
"Coloureds"	52 million
"Indians"	36 million
Blacks in self-governing territories	170 million
Blacks outside self-governing territories	269 million
Total	**R537 million**

In addition to these amounts, the fund held accumulated reserves, recurring capital (monies paid back into the fund by lenders) and interest received that brought the amounts available for distribution in that year to the following:

Whites	180 million
"Coloureds"	221 million

"Indians"	250 million
Blacks in self-governing territories	170 million
Blacks outside self-governing territories	330 million
Total	**R1151 million**

(South Africa,1990b:37). Of these funds, R848 million was lent out in the 1989/90 year (South Africa,1990b:13).

A number of institutions are responsible for allocating loans from the fund. The "own" affairs administrations each have a housing board which performs this task. Only the funds allocated for use by that race group may be used. The loans available to white municipalities are primarily used for the construction and development of new council-owned housing. A small proportion of these funds may be used for the electrification of these houses. Since all coloured and Indian residential group areas are served by white municipalities (except Pacaltsdorp which has its own local authority), the Departments of Local Government, Housing and Agriculture in the Administrations of the Houses of Representatives and Delegates provide monies directly to the white municipalities for development projects in "coloured" and "Indian" group areas.

The monies voted for expenditure on black urban infrastructural development (outside of self-governing territories) are allocated by a board called the National Housing Commission (NHC). The NHC is a statutory body made up of a group of fourteen appointed private individuals. Its primary function is to allocate the loans to black local authorities. Apart from using the funds placed at its discretion by the government, the NHC is also empowered to raise funds on outside capital markets. In doing so it is able to increase the total amount at its disposal. Bonds issued by the NHC are guaranteed by the state treasury. As at January 1990, the NHC had issued fixed interest bearing bonds on local capital markets totalling R398 million (The Stock Exchange Handbook,1990:324).

In order to facilitate the work of the NHC, staff within the Department of Planning and Provincial Affairs and the four provincial administrations process and prepare applications to the fund (South Africa,1990a). The development priorities of each black township in the province are determined and listed by officials in the Community Services Branch of the provincial administrations, in consultation with BLAs and their officials. These are documented and put before a meeting of the NHC for "in principle" approval. Once approved, private consultants are usually hired to produce a project feasibility study. Most importantly, this study provides an estimate of the cost of the project, including construction costs, professional fees and escalation rates. The provincial authorities collate all the projects thus investigated, and rank them according to a project rating system. This system weights those projects which are for the development of "basic" civil services (such as water, sewerage and roads) over projects to develop less important services, or "luxury" services. Within this system, the rating of bulk electrical infrastructure development projects and the installation of non-residential supply systems are accordingly higher than the rating for the low-voltage reticulation of an established unelectrified township. The system also takes into account the record of BLAs in repaying loans, downgrading the projects of those which have failed to repay loans in the past. As a result of all these factors individual projects from around the entire province are ranked in according to descending degree of urgency. The NHC then allocates funds to projects, from the top of this list downwards. The number of projects funded depends on the availability of funds. Not surprisingly, the list of approved projects awaiting allocation of funds is very long. At June 1989, the list in the Cape Province alone ran to approximately 1 600 projects. This system of allocating funds is currently under review. It is considered by some provincial officials to be too inflexible, particularly with regard to reducing funds to BLAs which are heavily indebted, but operate in areas of great need (Scholtz,1990).

As was noted above, the NHC was voted R269 million for expenditure in black areas outside self governing territories on all infrastructural projects in the 1989/90 financial year. To this it added approximately R40 million in reserves, R10 million in interest earned, R10 million in recurring capital (loan repayments) and the proceeds of its capital market transactions. Total allocations in that year by the NHC amounted to R416 million, of which R242 million was for the provision of new services to developing townships (South Africa,1990a:27).

Expenditure on electrification probably accounted for approximately 10% of the larger total, or about R40 million.

BLAs which receive loans from the National Housing Fund are supposed to repay them from revenues raised from rates, rents and charges for services. No distinction is drawn between lending for potentially revenue generating projects (such as electrification) and non-revenue generating projects (such as road construction). Because of the financial collapse of BLAs in a number of large black townships, many of these loans are not being serviced at present. The interest payments are being capitalised. The total debt of BLAs is therefore rising. Also, the capital held in the National Housing Fund for this purpose is not being replenished by loan repayments. As a result, the ability of the NHC to make fresh loans has been much reduced.

The failure of the system operated by the NHC to function effectively stems from the failure of the financial system within which BLAs were designed to function. BLAs have been saddled with enormous debt burdens as a result of rapid infrastructural development in the 1980's. The revenue base of most BLAs is limited by the fact that the residents of the township areas that they serve are poor, and that these areas contain no industries and little taxable commercial activity. Furthermore low rates of payment for electricity used has resulted from organised campaigns to unseat politically unpopular, and in some cases corrupt, BLA councillors. The generally poor standards of services provided have undermined the confidence of township residents in BLAs and further reduced the willingness of residents to pay service charges levied by BLAs. Under such circumstances the principle of cost-recovery development has been impossible to attain. It is clear that the system of financing capital development in black townships needs to be redesigned. Proposals for what steps might be taken are discussed in chapter seven.

In conclusion then, the National Housing Fund is the major source from which the development of black townships has been financed. The contribution from this source to electrification projects by in white, coloured and Indian areas is limited. The contribution of the Fund to electrification of black townships was recently about R40 million for one financial year.

4.5.2 The Local Authorities Loan Fund

The Local Authorities Loan Fund has been in existence since 1929. Its present format is prescribed by the Local Authorities Loans Fund Act (Act 67 of 1984). The fund was established to make loan funds available to local authorities for the financing of capital projects, as specified in the Act. Priority is given to funding the development of household water supplies, sewerage and sanitation, and electricity supply. Once projects have been approved, monies are disbursed to local authorities as projects get under way.

In terms of the Act, the Local Authorities Loans Fund Board is responsible for allocating the funds at the disposal of the Fund. The board is made up of a number of high-ranking state officials, including the Minister of Finance. The Act does not make specific provision for the granting of loans at subsidized rates or for any losses to be met from the State Revenue Fund. The Board thus manages the fund on a marginal profit basis. Interest rates charged by the fund are usually equal to the interest rates being offered by the treasury on similar term Republic of South Africa stock on the Johannesburg Stock Exchange (South Africa,1989b:2).

As is the case with the National Housing Commission, the Local Authorities Loan Fund Board is empowered to raise funds on outside capital markets, as well as receiving grants from the government from time to time. As at March 1989 the total value of the loans which the fund had issued to local authorities was R596 million. At that point, a total of R345 million had been raised by issuing treasury guaranteed stocks and bonds on capital markets. No additional capital was allocated to the fund by the government in the 1988/89 financial year (South Africa,1989b:9).

Although it is the policy of the Board to grant loans to all local authorities, including BLAs, the annual report of the fund indicates that while 104 loans were approved in the 1988/89 financial year, a further 77 applications were rejected. The rejected applicants appeared, in the opinion of the Board, to be unable to meet interest charges or repay loans. The financial position of most BLAs would have put them in this category had they applied for funds (South Africa,1989b:4).

In the 1988/89 year new loans to the value of R213 million were approved. Of this total, R18.5 million, or 8.7% of the total, was for electrification projects. In the

course of the same financial year R208 million was actually disbursed, of which R19.8 million was for electrification projects (South Africa,1989b:3).

In conclusion, the Local Authorities Loan Fund, although supposedly intended to provide funds to finance capital development projects undertaken by all local authorities is only accessible to financially sound white local authorities. Thus it has not contributed in any way to the electrification of black townships. Its contribution to electrification projects in urban areas was recently R19.8 million in one financial year.

4.5.3 The Development Bank of Southern Africa

The Development Bank of Southern Africa (DBSA) was set up in September 1983, following an agreement between the South African government and the "homeland" states of Transkei, Bophuthatswana, Venda and Ciskei. Its mission was to support economic development in Southern Africa through the granting of loan finance for development projects. As such it is a non-profit public corporation. It operates on the principle of cost-recovery lending.

The DBSA began its operations by taking over a number of approved and in-progress development projects from the South African government with a loan value in the order of R350 million. By March 1990, the DBSA had 1330 projects in the project cycle and had approved a cumulative total of 706 projects, on which it expected to have to make a total financial contribution of R4 894 million. The level of disbursements in 1989 was over R800 million (DBSA,1990:2).

Most of the funds held by the DBSA have been contributed to it by grants from the South African government. These are deposited in the DBSA's Development Fund and do not constitute a liability. The government committed itself to provide a total of R2,5 billion to this fund over the period between 1988 to 1993. The DBSA first entered capital markets at the start of 1990, with a public issue of stock valued at R175 million. The DBSA intends to mobilize an additional R1,5 billion over the next five years from local and foreign capital markets (DBSA,1990:6)

Although initially primarily intended as a funding agency for projects in the "homelands", since 1987 the DBSA has financed development projects throughout South Africa. The DBSA is also involved in a few projects outside of South Africa, in Lesotho, Namibia and Mozambique.

The DBSA has a particular concern that development institutions should be strengthened in the course of undertaking development projects. Accordingly, the DBSA places emphasis on joint work and training in its dealings with borrowers. It gives special attention to the development of sound financial controls within the borrower's administrative establishment. It also insists on participating in the initiation and design of the projects it eventually funds.

The DBSA has been involved in two sorts of electrification projects. Firstly, a number of projects have been undertaken in the past to upgrade bulk electrical networks which supply "homeland" areas and neighbouring countries. The allocation for electrification projects of this sort in the 1989/90 financial year was R166 million. Three large projects accounted for the bulk of that amount: R70.3 million for the construction of high-voltage lines to serve the Lesotho Highlands Development Project; R30.5 million for the electrification of Ezakheni in KwaZulu; and R9.2 million for the electrification of parts of Gazankulu (DBSA,1989).

Secondly, the DBSA has made a small number of loans for the electrification of urban areas in South Africa. Because of the concern of the DBSA that loans be repaid, and that the financial administration of borrowers be in good order, they have been reluctant to fund projects handled by BLAs. Nonetheless, a very limited number of loans have been issued to BLAs during the 1988/89 and 1989/90 financial years which are for township electrification, or which include the upgrading of electrical networks:

i. R10.6 million for the electrification of 9135 houses in Vosloorus (near Boksburg).

ii. R54.1 million for urban renewal programme in Alexandra (near Johannesburg) in conjunction with the Central Witwatersrand RSC, National Housing Commission and Eskom.

iii. R6.6 million for bulk and connector services (not only electricity) in Kutwanong (north of Welkom).

iv. R3.8 million for bulk and connector services to Daveyton (near Springs).

v. R2.2 million for the electrification of 1400 houses in Etwatwa West (in Daveyton).

(DBSA,1989; DBSA,1990).

In addition, the DBSA has approved a loan of R25.0 million to Kwanolec, for the electrification of KwaNobuhle. This scheme was described in section 2.9.3. It was supported on the basis of the belief that the involvement of Eskom (as holders of 50% of the share equity of Kwanolec) guaranteed its viability (Henn,1990). The bulk of this loan has not yet been disbursed, since the electrification of the township has been blocked by a political stalemate between Kwanolec and residents opposed to the scheme.

No indication is provided as to how the loans mentioned above are performing. On the basis of the projects mentioned above, and using the assumption that 10% of funds allocated for general purposes are used for electrification projects, the DBSA has financed electrification projects in urban areas to the value of approximately R10 million per year.

The DBSA is an organisation which has accumulated considerable expertise and gained some credibility over the seven years that it has been in existence. It is likely to play an important role in supporting development initiatives in the future. However, as a result of its policy of lending on a cost recovery basis, and of the financial collapse of most BLAs, the DBSA has not yet played a significant role in the electrification of black townships.

4.6 International Development Funds

International development funds such as the World Bank and its "soft loan" associate organisation, the International Development Association (IDA) are major lenders of capital to developing countries for energy infrastructure development projects. In many cases, loans to the electricity sector are a major component of all loans granted to any lender nation. These funds are lent at concessionary interest rates. Loans granted by the IDA, for example, are repayable after 50 years, without interest but with a service charge of 0.75% per year (Collier,1984).

South Africa is currently classified by the World Bank as a donor country, rather than as a recipient country. Statistics on South Africa have not been maintained by the World Bank, who have also not had a presence in South Africa. With the political developments currently under way in South Africa, these agencies are again showing an interest in re-establishing local offices. World Bank officials visited South Africa in 1990 to consult with the South African government and a variety of local organisations. Although the statements made to the press thus far have been tentative, it appears that the World Bank would consider channelling funds into Southern Africa through the DBSA (Business Day,1990). It is possible that the World Bank could be a source of finance for electrification projects in the future.

4.7 Conclusion

A few significant conclusions can be drawn from the description of the financing of electrification projects provided in this chapter. Firstly, the current funding system functions well in channelling capital to financially strong white municipal electricity departments. However, the system does not function adequately for electrification projects in black townships. This has occurred because of the financial collapse of BLAs. The huge spending backlogs, and the low rates of payment for electricity in many townships, does not allow for infrastructural development to be funded from external sources on a cost recovery basis.

Secondly, as a result of the shortage of capital for the electrification of black

townships, developers are required to pay for a significant part of the installation of bulk electrical systems. As a result, the cost of houses in these areas, already out of reach of most black South Africans, is inflated.

Thirdly, the amount of capital that is currently available at interest rates low enough to finance the development of electrical systems is inadequate. Currently, no more than R320 million is being spent each year on electrification projects in South Africa. As a result of the scarcity of information about the financial affairs of local authorities, only approximately R80 million of this expenditure has been accounted for in this chapter. The contributions from developers, from local authority reserve funds, and from RSCs could not be estimated. Whatever the actual current capital expenditure on electrification projects, it is certainly lower than the target mentioned by Dingley (1990:22) of R700 million per year needed to provide electricity to all potential users within 20 years.

Finally, within the process of restructuring local government structures on a non-racial basis, as is currently being proposed, attention should be given to increasing and simplifying the access of electricity distribution authorities to loan capital, so as to make available funds for the electrification of underdeveloped areas. Such funds will likely originate from both public and private sources. This topic will be further developed in chapter seven.

CHAPTER FIVE

PUBLIC AND PRIVATE OWNERSHIP OF URBAN ELECTRICITY DISTRIBUTION AUTHORITIES IN SOUTH AFRICA

5.1 Introduction

The aim of this chapter is to consider the benefits and disadvantages of public and private ownership of electricity distribution authorities in South Africa. The content of this chapter, and of the two which follow it, is more conceptual and prescriptive. Attention is given to the form that the distribution sector of the South African ESI might take in the future.

The existing range of distribution authorities in urban areas was described in chapter two. The overwhelming majority of these authorities are located in the public sector as semi-autonomous local government electricity departments. The only examples of privately owned electricity distribution authorities are Kwanolec (Pty)Ltd. and Kescor (Pty)Ltd.

Before proceeding, a few terms should be explained. Public ownership will be used here to describe a range of different situations, where the assets of an enterprise are owned by its consumers (such as electricity co-operatives), or by the "public" (such as in the case of public corporations like Eskom); or by the central, regional or local levels of the state (such as municipal electricity departments, and RSC electricity departments). Private ownership will be taken here to mean that the assets of an enterprise are owned by private investors who expect a return on their investment in the form of dividends and/or capital appreciation.

In order to discuss the benefits and disadvantages of public ownership of distribution authorities the main conclusions regarding the performance of existing publicly owned distribution authorities in urban areas will be briefly recalled. In order to discuss the benefits and disadvantages of private ownership in a practical way, the issue of privatisation must be addressed. Kwanolec and

Kescor are the only two privately owned distribution authorities, and are not strictly representative of the type, since in both cases Eskom, itself a public corporation, is both a major shareholder of and the major supplier to the company. Therefore, in considering the case for private ownership, attention will be given to defining privatisation, examining how privatisation of existing electricity distribution authorities might occur, and the potential performance of privately owned distribution authorities.

The term "privatisation" is defined by Cook and Kirkpatrick (1988:3) as a range of different policy initiatives designed to transfer economic activity from the public sector to the private sector. The first and most obvious of these initiatives is the sale of publicly owned enterprises, or part of such enterprises, to private investors. This type of initiative may also be termed "denationalisation". Cook and Kirkpatrick (1988:3) note that the privatisation of a publicly owned enterprise can proceed in the following ways:

i. The sale of all, or part, of an enterprise's equity through a public offering to private investors. This requires the presence of a relatively well developed capital market, including a range of potential investors, financial intermediaries and stock trading systems.

ii. The sale of an enterprise to a single private investor. This requires the presence of investors large enough to purchase the entire enterprise.

iii. The abandonment or formal liquidation of an enterprise, resulting in its role being replaced by private initiatives.

The second commonly encountered type of privatisation initiative is deregulation, which opens up protected markets to the private sector. Given the fact that the main business of electricity distribution (buying electricity in bulk and selling it to individual consumers) is a natural monopoly, as was explained in chapter one, deregulation is not an important factor, and will not be considered here.

The third commonly experienced type of privatisation initiative is that of contracting out. Here, activities previously undertaken by public sector organisations are contracted out to private operators. In the case of electricity

distribution authorities there is scope for private contractors to undertake billing, maintenance of networks and other peripheral activities. This practice, although it is not unimportant in ESI's in developed countries, is not well developed in South Africa, and will not be considered in any detail in this section. The contracting out of tasks to private operators in the implementation of electrification projects in urban areas is dealt with in chapters three and six.

Support for the privatisation of parts of the ESI in South Africa has originated from a number of different quarters. In the 1987 White Paper on Privatisation and Deregulation in South Africa, the government expressed its support for the sale of public assets to private investors under certain conditions. It argued that privatised enterprises should not be of strategic importance to the country, nor should they be public monopolies (Thomas,1988:15). Despite these rather stringent qualifications, State President P W Botha announced in 1988 that Eskom was to be considered for privatisation. This proposal shuttled between the Electricity Council, Eskom's controlling board, and the government for two years, and was then shelved. Recent public statements by Eskom officials indicate that the privatisation of Eskom is no longer considered to be a serious issue (Engineering Week,1991:1).

As regards the privatisation of electricity distribution authorities, Eskom developed the concept of establishing joint venture companies (JVCs) to supply electricity to black townships. According to this model, BLA electricity departments are replaced by private companies. These companies are jointly owned by Eskom and by other private or institutional investors. Schemes of this sort have thus far only been implemented in KwaNobuhle (Kwanolec (Pty) Ltd.) and in KaNgwane (Kescor (Pty) Ltd.). These two schemes were described in sections 2.9.3 and 2.8 respectively.

A small number of members of the Association of Municipal Electrical Undertakings (AMEU) have expressed support for the privatisation of white municipal electricity departments. Two municipalities in the Transvaal, those of Kempton Park and Pretoria, have given attention to the possibility of their electricity undertakings being privatised. Consideration has been given to the actual practicalities of such an initiative, involving the sale of the distribution authority in a series of stages (Malan,1990).

Support has at various times been given by the Development Bank of Southern Africa (DBSA) to the idea of privatizing aspects of urban service provision. For example, a proposal to that electricity distribution should be privatised was included in the recommendations of the Brand Report on the finances and economy of Soweto (Mohlabane,1990:375).

As was mentioned in chapter one, support for privatisation in South Africa has dwindled since the end of the 1980's. Yet the issue cannot be considered to be entirely settled. South Africa is increasingly being exposed to interaction with the outside world, where privatisation remains a prominent policy initiative. Thus, for example, the World Bank currently advocates greater private sector involvement in electricity provision (Churchill and Saunders,1989). Interaction with such organisations in the future is likely to reintroduce debates about the relevance of privatisation.

In the sections of this chapter which follow, private ownership of distribution authorities will be considered within two scenarios. Firstly, the effects of privatising local government electricity departments, and other existing structures, as they are presently structured will be considered. Secondly, the effects of privatising regionally rationalised distribution authorities which may be formed in the future will also be considered. The three aspects of distribution authority performance used in chapter two will also be used here. Thus, the effects of these initiatives on financial performance, economic efficiency and effectiveness of distribution authorities will be examined. Each of these aspects will be dealt with in the three sections which follow this introduction.

The chapter ends with a brief conclusion which draws together the major observations made in preceding sections.

5.2 Ownership and the Financial Performance of Distribution Authorities

In chapter two the financial performance of electricity distribution authorities was defined in terms of two financial indicators. The first was their level of profitability, as revealed by the size of the profit or surplus that they are able to generate. The second indicator was that of relative indebtedness, which was a more qualitative measure used to assess the size of their debts in relation to their assets and their income, and their ability to meet repayments on external loans. It was noted that good financial performance did not necessarily imply that distribution authorities were operating efficiently or effectively.

As was shown in section 2.3, white municipal electricity departments are commonly very profitable. Most generate surpluses in the region of 10% of operating income, whilst some are known to generate substantially more. These surpluses are transferred to general municipal accounts, thereby relieving upward pressure on municipal property rates. The debt burdens of most white municipal electricity departments are large in absolute terms, but small in relation to their assured income from electricity sales.

The financial performance of BLA electricity departments, as discussed in section 2.4, is usually poor. Most are responsible for creating deficits on the trading of electricity, since they are not able to collect more from electricity consumers than they pay to their bulk suppliers. The debt burdens of BLA electricity departments are usually unmanageably large, and growing. Within the system of infrastructural development and service provision in black townships, BLAs are saddled with very substantial loans from state-sponsored development funds, which they are unable to service from available revenue. As a result of the administrative, financial and political collapse of BLAs in most regions of the country their financial performance has declined to the point where they are dependant on handouts from provincial authorities and RSCs in order to cover their operating costs.

The financial performance of other publicly owned distribution authorities, namely RSCs, Eskom, and "homeland" electricity corporations and government structures, was not discussed in great detail. Eskom tariffs are set generally set at levels which ensure that the costs of electricity provision are completely

covered over the life of the systems installed. The other authorities mentioned were seen to operate in relatively few areas, without generating significantly large deficits or profits.

The financial performance of publicly owned distribution authorities is not closely monitored or regulated. The one attempt to specify profitability limits which was described in section 2.3, by the Browne Committee in 1980, was overturned by the Croeser Working Group in 1982 (South Africa,1980:103; South Africa,1982:51). Yet, the practice of regulating the performance of publicly owned enterprises is well established internationally. For example, publicly owned electricity distribution authorities in the United Kingdom were subjected to close regulation in the period prior to their privatisation at the end of 1990 (Vickers and Yarrow,1988:285). Targets specifying their profitability; their operating surplus as a percentage of the return on capital employed; and their rate of return on new investment were set by an outside office of electricity regulation. This regulatory agent was also located within the public sector. The potential for steps such as these may exist in South Africa, particularly if financially viable electricity distribution authorities were formed after being restructured on a regional basis.

Private ownership of electricity distribution authorities in South Africa is not well developed. One established, privately owned distribution authority in an urban area, Kwanolec, was examined in section 2.9.3. It was noted that Kwanolec has so far operated at a loss, since it has not yet extended electrical supplies to enough consumers to be financially viable. Also, the company is not yet significantly indebted, but has access to a loan at favourable terms from the DBSA. Since this scheme is small and not fully functioning, it is not possible to draw any worthwhile comparisons between its performance and that of publicly owned distribution authorities.

In order to speculate about what the effects of privatisation and private ownership on the financial performance of distribution authorities might be, a number of assumptions and observations must be made about the nature of the process of privatisation that they might undergo. It is assumed that distribution authorities would be sold in their entirety, with all of their assets and liabilities being transferred to a private investor, or a number of investors, through the sale of equity shares. The proceeds of the sale might accrue to the central treasury, local government treasury, or even to consumers or members of the public, depending

on who is seen as "owning" the assets in the first place. Next, it is assumed that the entire staff of the distribution authority are also transferred and retained, at least initially, by the new owners. It is further assumed that the exclusive right to distribute electricity to a defined area, the basis of monopoly power, would be transferred to the new owners. Also, it is assumed that the privatised distribution authority would no longer have access to cheap capital subsidised by the state. Finally, it is assumed that privately owned distribution authorities would become liable for all taxes, levies and rates payable by private companies in South Africa.

Establishing the sale price of a public asset presents a number of complex problems. The "value" of an asset may be perceived differently by different actors. For the purposes of privatisation, where the intention is to sell the asset for a price, the relevant value is that attached to the asset by potential investors. An equity share offering will attract private capital only if the expected return on the new shares is comparable to other equity investments of similar risk and conditions.

The return on equity invested in electricity distribution authorities is dependant on the financial environment in which they will operate after privatisation. Given their monopoly power, privately owned distribution authorities potentially have very wide scope to raise prices and profit levels. Thus, their monopoly power is usually constrained by state regulation. There would thus be a direct trade-off between the sale price of a publicly owned electricity distribution authority, and the extent to which it would be allowed to raise tariffs after its privatisation. If the sale price were high, investors would only purchase the equity if they were guaranteed a satisfactory return, which would probably require large and sustained tariff increases. If the sale price were low, greater control could be exercised over tariff increases, while still providing investors with a satisfactory (from their point of view) rate of return on capital invested.

As a result of these uncertainties, public assets being privatised are frequently underpriced. The British government was criticized repeatedly on this score during the course of the privatisation programme that it undertook between 1979 and 1990. For example, after the first day of trading, the value of shares in the twelve distribution companies privatised in December 1990 rose by over 50% of the issue price (The Economist,1990a:70). Underpricing of public assets leads to windfall gains for investors once the stock issued is traded on open markets.

In the light of the importance of regulation on both the sale price of a publicly owned distribution authority, and its subsequent behaviour, the topic will be examined in more detail here. Regulation of privately owned monopolies sets out to balance the interests of investor-owners and consumers. The design of regulatory regimes to monitor and control the performance of firms with monopoly power is a complex subject. A thorough examination of the topic is provided by Vickers and Yarrow (1988). It is not possible in a study of this scale to deal with this topic in any detail. Instead, brief descriptions of two widely practised methods of regulation will be provided, followed by a discussion of some of the problems inherent in the economic regulation of natural monopoly activities.

The first widely practised method of regulation is rate-of-return regulation. This method has been used extensively in the United States of America to control public utilities. Its operation is described in Plummer et al (1985). Within this system, the private owners are allowed a "fair" return on the capital they have invested in the company. Tariffs are set at levels which will ensure that this return is realised. Two problems immediately arise with the application of this method. Firstly, it is not clear what constitutes a "fair" return. It may be difficult to set a level of return which investors will find attractive, without passing on high costs to consumers. Secondly, under certain conditions the company may over-invest in order to increase the returns achieved, resulting in the inefficient use of resources. This problem, and ways in which it has been addressed, is discussed in some detail by Vickers and Yarrow (1988).

A second approach to the regulation of natural monopolies, known as the price-capping method, has been developed and applied in the United Kingdom (Vickers and Yarrow,1988). Briefly, in this system allowable tariffs are set at base levels at the start of the regulatory period, on the basis of a thorough investigation of the cost structure of the enterprise. In subsequent years the tariffs that the enterprise may charge are allowed to increase by a factor given by the formula, $RPI - x + y$. Here RPI is the retail price index; x is a number based on an assessment of the ability of the enterprise to reduce its real controllable costs; and y is a number which reflects *real* increases of costs beyond the control of the enterprise. Thus for an electricity distribution authority, if the tariff charged at the outset is T_0 ; the assessed ability of the enterprise to reduce its use of controllable inputs by improving its productive efficiency (x) is, say, 3% per year;

the *RPI* in year one is 110; and the *real* bulk price of electricity increases by 1% at the end of year one, then the new tariff at the end of year one will be $T_1 = T_0$ (110 - 3 + 1) = T_0 (108). Within this system the real price of electricity thus falls by x% per annum, less any real increases in uncontrollable costs. Proponents of this system argue that it controls the item of greatest concern to consumers, namely the price paid for the product or service provided. The system also links profit increases for investors to productivity increases. The problems of applying this system relate to the initial process of establishing T_0 and x. The regulatory agency may be unable, or unwilling, to set these variables at levels which force the enterprise to operate efficiently.

A number of additional issues arise in connection with the regulation of private distribution authorities. In order to be effective, the role of the regulatory agency must be clearly defined and executable. For example, Vickers and Yarrow (1988) note that problems can arise if a lack of access to information limits the ability of the regulatory agency to effectively monitor the performance of the enterprise. Owners and managers may have access to information regarding the operation of the enterprise that they would be unwilling to share with regulators.

Other debates also arise as to where the regulatory agency should be located within the state, and what should its level of autonomy from government be. Separation from the state reduces the ability of elected politicians to influence regulators. On the other hand, unaccountable independent regulators may not act in the public interest.

In situations where financial and economic conditions change quickly, regulation is rendered less effective. Thus, for example, the problem of "regulatory lag" may arise when conditions of high rates of inflation or fluctuating interest rates are experienced. In this case, the period between regulatory reviews is too long to ensure that prices and profits are correctly set. This situation arose in the 1980's in the United States of America, and along with other developments in the ESI of that country, led to a decline in the profitability of privately owned distribution authorities (Plummer et al,1985).

In the light of these observations, it is clear that the privatisation of publicly owned distribution authorities and their subsequent operation raise a series of complex problems. In the rest of this section, the possible privatisation of South

African distribution authorities will be considered from a more practical perspective.

White municipal electricity departments could conceivably be privatised in their present form. The right to supply electricity to a particular area could be transferred to a private company, with the permission of the Electricity Control Board. On a practical level, additional municipal assets and staff would need to be incorporated into the enterprise to be sold. For example, people and computer systems in the city or town treasury involved with running the billing system would need to be transferred to the new enterprise. Departmental managers would be required to assume full responsibility for the financial management of the electricity undertaking.

In order to arrive at a sale price, an estimate of the net present value of the stream of profits that would be generated by the privately owned distribution authority would have to be carried out. In particular, various factors would need to be examined to assess the profitability of the distribution authority under private ownership. These would depend largely on the regulatory system under which it would operate.

The regulation of privately owned electricity distribution authorities in South Africa is currently the responsibility of the Electricity Control Board (ECB), which acts in terms of the Electricity Act (Act 41 of 1987). The Act gives the ECB very wide powers to determine the conditions and the terms on which these authorities may distribute electricity. A schedule of allowable tariffs that they may charge is laid down in the licence issued by the ECB. Tariff increases are subject to the approval of the ECB. In the experience of the management of Kwanolec, this system operates loosely. Annual tariff increases are approved without much comment or discussion (van Zyl,1990). Since Kwanolec is not profitable, the problem of what a fair rate of return for its investors should be has not yet arisen. If widespread privatisation of distribution authorities were to occur, the present regulatory system in South Africa would probably need to be investigated, and possibly revised.

Whatever the approach adopted to regulating privately owned distribution authorities, it is safe to assume that their investors would be guaranteed some positive return on their investments. If the returns offered by these investments

were lower than the return offered by corporate equity of similar term and risk then the privatisation process would be stalled due to lack of investor interest. A return of, say, 10 to 15% per annum would probably be necessary. These dividends would be payable out of the company's after-tax profits. Depending on the sale price, tariffs after privatisation may need to be increased in order to enable to the company to meet these commitments.

Privatisation of electricity undertakings would have important implications for municipal finances. If the proceeds of privatisation accrue to the municipality, this money could be invested elsewhere, realising a further return. Malan (1988) advances this idea, suggesting that the sale proceeds should be invested by the municipality so as to realise a return at least equal to the stream of profits lost by the disposal of the electricity department. Alternatively, if the proceeds accrue to another party, such as the central treasury or to current electricity consumers (by means perhaps of a cash payment based on current consumption), then the municipality will have lost a significant source of income. In this scenario municipalities would probably be forced to raise property rates substantially.

Once privatised, these distribution authorities would not have access to capital which was subsidised by the state. Even so, given their financial strength, it is likely that these enterprises would be able to sustain loan repayments on more expensive, un-subsidised capital obtained for electrification projects. Once again, electricity tariffs would probably be raised to meet these commitments.

On balance, the most significant effect of the privatisation of white municipal electricity departments would probably be to lead to increased electricity tariffs for all categories of consumers. This would likely be the case for a number of reasons. Firstly, taxes payable to local, regional and central government would increase overall expenditure. Secondly, greater capital charges would push up costs, as was described above. Thirdly, dividends payable to private owners would further increase overall expenditure. Improvements in productive efficiency, which will be discussed in the next section, would be unlikely to offset all of these factors. Tariffs charged would probably need to be significantly higher than those charged at present, in order to match increased expenditure with increased revenues.

The privatisation of BLA electricity departments in their present form would

present more severe problems. On a practical level, underdeveloped and understaffed departments could not be privatised as a unit without steps being taken to obtain sufficient staff, particularly at upper managerial levels. As with white municipal electricity departments, staff and assets from the city or town treasury would either need to be replaced, or transferred to the enterprise upon its sale.

In order to arrive at a sale price, valuations of the worth of these departments would need to be carried out. The potential of these departments to make a profit if privatised would need to be established. Two possible means of improving the profitability of BLA electricity departments could be implemented. Firstly, a part of their debts could be written off by the state at the time of their sale, thus reducing the costs of loan repayments that they would have to make. Secondly, the ongoing operation of these private distribution authorities could be subsidised by the state in one way or another. Thus the "profitability" of the enterprise would be based on the continuous injection of funds from general tax revenues. It should however be noted that the subsidisation of loss-making private enterprises results in a number of complex problems, particularly with regard to structuring incentives for the enterprise to improve its efficiency. Since their losses are always covered, little incentive exists for such efforts. These problems are discussed in more detail in Vickers and Yarrow (1988).

Privatisation would create other serious financial problems. Once privatised, these distribution authorities would not necessarily have access to capital which was subsidised by the state. Privately owned distribution authorities in these areas would be forced to raise their own equity and loan capital to finance new projects. Thus, privatisation would remove the burden of financing electrical infrastructural development in black townships from the state. In the early days of support for privatisation in South Africa, arguments of this sort were made by the government. For example, the discussion paper produced after the 1986 Pretoria Indaba between the government and representatives of business entitled "Framework for Discussion on Privatisation" argued that privatisation was one way in which state expenditure could be reduced and consumer demands on the public sector could be disciplined (Thomas,1988). The effect of such steps would be to make it impossible for the electrification of all urban areas to be realised. The electrification of low-income areas is not immediately profitable, due to initially low take-up rates and the slow transition to the use of electricity. Access

to capital on highly favourable terms is therefore crucial to the viability of such projects. If such credit were not available to private distribution authorities, they would be unable to justify electrification projects on financial grounds. Privatisation would therefore halt the electrification of black townships.

The privatisation of the twelve regional distribution authorities that currently make up the Eskom Distribution and Marketing group, would probably have similar effects on profitability to those experienced by white municipal electricity departments. The electricity tariffs it charged to end consumers would probably increase significantly. Eskom is a non-profit organisation which has never been funded by tax revenues. Thus complex debates might ensue about what its sale price should be, and to whom the proceeds of the sale should accrue.

Many proponents of privatisation policies, including Anderson (1990), argue that regionally rationalised distribution authorities, formed after the demise of racially segregated local government structures in South Africa, might eventually be successfully privatised. It is difficult to assess this suggestion, since it is not at all clear what institutional form such distribution authorities would take. Regional rationalisation would ensure that a wider, regional tax base was available to finance the electrification of new areas. Nonetheless, it is likely that a programme to rapidly electrify all areas in South Africa would still require the provision of cheap capital by the central state over an extended period. In this context, the fact that electricity provision must be profitable if it is to be carried out by private distribution authorities would still create problems. Without sustained access to sufficient cheap capital, which distribution authorities owned by private investors would not enjoy, the electrification of all black townships could not proceed.

In conclusion, privatisation of electricity distribution authorities in urban areas of South Africa makes little sense from a financial perspective. White municipal undertakings and Eskom regional distribution authorities could be sold in their present form with a few changes to their structure and the existing regulatory system. The tariffs charged by private distribution authorities would probably be significantly higher than present tariffs. The privatisation of BLA electricity departments appears to make very little sense, since their performance would be unlikely to improve, and their costs would probably increase.

Potential exists for steps to be taken to regulate the financial performance of publicly owned distribution authorities in South Africa, particularly if financially viable electricity distribution authorities were formed after being restructured on a regional basis. This may improve their performance in this respect, without introducing the necessity for profitability in instances where it is not achievable, or not desirable for other reasons. Given the ongoing need for state subsidisation of electrification projects, even in the context of such rationalisation, privatisation may only resurface as a policy option once the profitability of the industry as a whole is secured.

5.3 Ownership and the Economic Efficiency of Distribution Authorities

The aim if this section is to assess the relationship between ownership of electricity distribution authorities and their economic efficiency. First the efficiency of publicly owned authorities will be discussed, followed by a discussion of the efficiency of privately owned authorities. In chapter two the economic efficiency of electricity distribution authorities was discussed, using both quantitative and qualitative indicators. Attention was focused on productive efficiency, rather than allocative efficiency. Quantitative indicators used were the number of consumers per distribution authority employee, and the rate of change of labour costs in relation to the rate of change of distribution authority output. Qualitative indicators used were the existence of budgetary constraints, and the quality of management and the potential for its improvement.

The efficiency of publicly owned electricity distribution authorities in South Africa is not high. Using quantitative indicators for the City of Cape Town electricity department, it was suggested that the efficiency of white municipal electricity departments is slightly below average by international standards, and has not improved significantly in recent years. Judging from qualitative indicators, it was observed that despite budgetary constraints and widespread support for productivity improvements, the effects of these on productive efficiency have probably been less than impressive. The inadequacy of incentives to improve managerial performance, and the uncompetitiveness of municipal salaries is

demonstrated by the fact that many of these departments are unable to recruit and retain sufficient electrical engineers and managerial staff.

For BLA electricity departments, statistics were found to be very sparse and insufficiently detailed to provide useful quantitative indicators of productive efficiency. The organisational structures of these departments are generally underdeveloped, and information systems and staff training programmes are not well established. The lack of budgetary constraints and the poor cost consciousness in these departments probably indicates that productive efficiency is not good, and that it is unlikely to be improving. The scarcity of qualified electrical engineers and managers also limits the potential for increasing productive efficiency.

The economic efficiency of other publicly owned distribution authorities, namely RSCs, Eskom, and "homeland" electricity corporations and government structures, were not discussed in great detail. Apart from the regional Distribution and Marketing authorities of Eskom, where productivity programmes have been applied consistently since 1985, the efficiency of these authorities is, if anything, likely to be worse than that of most white municipal electricity departments.

In discussing the efficiency of publicly owned enterprises, Vickers and Yarrow (1988) note that public interest theories, which suggest that the public sector always acts in the best interests of the broader population, are now considered to be rather heroic. Public administration theorists emphasise the potentially distorting role that pressures from politicians, who may have short-run interests related to re-election, play in public enterprise performance (Brett,1988). Also, officials in public enterprises may tend, under certain circumstances, to be more interested in accumulating power and influence than in pursuing increased productive efficiency. For example, remuneration of officials may be linked to the size of their departments, rather than to the quality of their individual performance. This problem is probably less pronounced in the private sector.

MacKerron (1985) points out that many steps can be taken to improve the performance of publicly owned enterprises. For example, they can be subjected to "external" regulation (from a regulatory agency located elsewhere in the state) and placed under pressure to improve their productive efficiency. Targets can be set to reduce their use of controllable inputs. Incentives to improve managerial

performance under public ownership could also be designed.

Private ownership of electricity distribution authorities in South Africa is not well developed. One established privately owned distribution authority in an urban area, Kwanolec, was examined in section 2.9.3. It was noted that Kwanolec has yet to extend electrical supplies to enough consumers to be financially viable. The company contracts out most of the activities involved in its operation, in some cases for significantly less than these services cost to provide. However, since this scheme is small and not fully functioning, it is not possible to draw any worthwhile comparisons between its efficiency and that of publicly owned distribution authorities.

The privatisation of existing distribution authorities and their subsequent economic efficiency will be considered here. The assumptions and observations made in section 5.2 about the process of privatisation that these distribution authorities might undergo, and the nature of the regulatory system that they might subsequently operate under, will also be used here. Thus, in particular, it was assumed that the entire staff complement of the distribution authority would be transferred and retained, at least initially, by its new owners. It was also assumed that the exclusive right to distribute electricity to a defined area, the basis of monopoly power, would be transferred to the new owners.

In order to provide a context for the consideration of this issue, a number of points commonly stated in debates about the effect of privatisation on efficiency will be stated, whether they are relevant to the privatisation of electricity distribution authorities or not. Proponents of privatisation frequently argue that public sector enterprises are inefficient. Cook and Kirkpatrick (1988) note that there is currently widespread disillusionment with the performance of public enterprises in developing countries. Supporters of privatisation often claim that privately owned enterprises are more efficient than public enterprises because they are exposed to competition. Managers in private companies, it is argued, perform better than their counterparts in the public sector, since they fear that they will lose their jobs if the enterprise is threatened by bankruptcy or takeover. Also, it is argued that shareholders of private companies monitor enterprise performance and pressurise managers to improve their effectiveness. For example, such unequivocal support for privatisation has emanated at times from certain quarters of the South African financial press (Thomas,1988).

In assessing the validity of these arguments, Vickers and Yarrow (1988) note that competition between enterprises in a particular industry tends to result in productivity improvements across that industry, since less efficient enterprises do not survive and are weeded out. On the other hand they note that many industries, particularly in developing countries, are in fact not competitive. This may be due to the economic characteristics of the industry, to government intervention, or to both of these factors.

Galbraith (1986) argues that a number of the assumptions inherent in the belief that managerial performance in large private corporations is good, are questionable. Shareholders of these corporations may be a large and dispersed group of individuals with little ability to monitor or affect managerial performance. Also, even if the threat of takeover or bankruptcy are real, it may not follow that managerial performance will necessarily improve, especially once managers no longer believe that their efforts will save the company. Nonetheless, it is true that in most countries large rewards and status accrue to those in executive positions in large private corporations. This factor tends to ensure that at least the top management of most private corporations are well qualified and motivated (Vickers and Yarrow,1988).

In the case of the distribution sector of the electricity supply industry, discussions of the comparative efficiency of public and private enterprises must begin with the observation that competition in electricity distribution is not possible as a result of its nature as an economic activity. Thus the major factor in promoting efficiency in privately owned enterprises is absent. As was argued in section 5.2, the performance of privatised distribution authorities would depend on the nature of the regulatory system under which they were forced to operate.

In the discussion of regulatory systems in section 5.2, it was noted that different methods of regulation place emphasis on monitoring and controlling different aspects of enterprise performance. For example, the price-capping ($RPI - x + y$) method limits the ability of distribution authorities to raise tariffs, while allowing them to increase their profit margins by improving their productive efficiency. On the other hand, the rate of return system monitors the return on one input, namely capital applied, but limits profit margins. Thus the former method directly encourages improvements in productive efficiency, while the latter method does so only indirectly.

It should be noted that productivity in privately owned distribution authorities may increase at the expense of the quality of service provided. Vickers and Yarrow (1988) note that it may be possible to specify performance objectives linked to the quality of service in the design of regulatory systems, but that it may be difficult to monitor compliance with these objectives.

These observations indicate that while the privatisation of publicly owned distribution authorities might lead to improvements in productive efficiency, that these improvements may not be significant and are by no means automatic. In a number of cases, efficiency improvements could equally well be attempted in publicly owned distribution authorities. In the light of the foregoing comments, the possible privatisation of South African distribution authorities will be considered from a more practical perspective.

Privatisation of white municipal electricity departments in their present form is conceivable, subject to a number of qualifications discussed in section 5.2. They would probably operate under close regulation, and be guaranteed a certain level of profitability through their right (with the approval of regulators) to increase electricity tariffs. The incentives for better managerial performance may improve, by virtue of the greater flexibility in the design of remuneration packages for top management. Close regulation would probably reduce the effectiveness of the pressures from shareholders to improve managerial performance. The greater status associated with working in the private sector may make it easier to recruit engineers and other professionals to private distribution authorities. On the other hand, the overall shortage of electrical engineers in South Africa would probably mean that recruitment would still remain a problem.

Privatisation of BLA electricity distribution authorities would probably not remove the obstacles currently preventing improvements in their productive efficiency, such as organisational underdevelopment and lack of financial control. This is particularly true given that they would probably need ongoing subsidisation by the state. As was noted in section 5.2, the subsidisation of loss-making private enterprises removes the incentive for their management to improve efficiency, since their losses are usually covered, regardless of their magnitude.

The privatisation of Eskom Distribution and Marketing authorities, would likewise

subject them to regulation, limiting the scope for significant improvements in productive efficiency. This is particularly true since they have already experimented with productivity programmes over a long period. The same argument applies to regionally rationalised distribution authorities that might be formed in the future.

In conclusion, given the nature of the distribution authorities, and the consequent need for their comprehensive regulation, it would appear that there is no clear relationship between ownership and their efficiency. Thus, privatisation of existing distribution authorities in South Africa cannot be argued on the grounds of the need to improve their productive efficiency alone.

5.4 Ownership and the Effectiveness of Distribution Authorities

In chapter two the effectiveness of electricity distribution authorities was defined as the extent to which they approach the ideal of providing reliable and affordable electricity to all potential consumers within their areas of supply. It was noted that effectiveness may be constrained for a number of reasons. Failure to electrify new areas may result from institutional obstacles or from the fact that electricity cannot be made affordable due to a shortage of cheap capital for electrification projects.

Within the racially defined areas in which they have functioned, most white municipal electricity distribution authorities have been relatively effective. They have operated electrical networks in their areas of supply for a number of decades, and have been able to provide reliable and affordable electricity to practically all potential consumers. It was argued in section 2.3 that these departments have been effective precisely because they have most often been shielded from the areas where electricity provision is likely to be less profitable, and where the greatest need exists for rapid electrification.

Most BLA electricity departments have had a short and troubled history, and do not yet function effectively. They have also not succeeded in carrying out the

rapid electrification of black townships. This failure has largely resulted from the weaknesses of the racially segregated system of local government of which they are a part. In particular, the financial system within which BLAs were designed to operate has collapsed, preventing BLAs from obtaining capital for further electrification projects.

The effectiveness of other publicly owned distribution authorities, namely RSCs, Eskom, and "homeland" electricity corporations and government structures, was not discussed in great detail. Apart from the regional Distribution and Marketing authorities of Eskom, whose role is mostly limited to the provision of electricity to larger consumers, the effectiveness of these authorities has been poor. RSC and "homeland" distribution authorities were established on the basis of racial considerations, rather than considerations of effectiveness. For various reasons, they have provided electricity to only a small proportion of potential consumers.

It would be wrong to conclude from these observations that public ownership of electricity distribution authorities in South Africa has been proven to be unable to effectively provide electricity in black areas. Up to now, the government, has failed to play a pro-active role in promoting electrification of these areas. In particular, the regional rationalisation of distribution authorities and the redesign of the system of financial subsidisation of electrification projects by the state are two policy suggestions which have been made by Dingley (1990), and others, but not acted upon. It is quite possible that effective publicly owned distribution authorities could be established to serve all areas in South Africa.

As noted before, private ownership of electricity distribution authorities in South Africa is limited to Kwanolec, which was examined in section 2.9.3. Kwanolec has not been effective because it has yet to adequately electrify KwaNobuhle. It has been opposed by residents who object to the notion that electricity should be in private hands (Ureco,1990).

The potential effectiveness of privatised distribution authorities will be discussed here. Once again, the assumptions and observations made in section 5.2 about the process of privatisation that these distribution authorities might undergo, and the nature of the regulatory system that they might subsequently operate under, will be used. Thus, in particular, it was assumed that they would no longer have access to cheap capital subsidised by the state. It was also assumed that the

exclusive right to distribute electricity to a defined area, the basis of monopoly power, would be transferred to the new owners.

The effectiveness of privatised white municipal electricity departments would probably not change markedly, since their areas of supply are in any event well covered. For a number of reasons mentioned in section 5.2, electricity tariffs would probably increase. These changes could make electricity unaffordable for poorer consumers. Furthermore, private ownership could result in a decline in the quality of service provided, unless adequate means of preventing this by regulation were devised.

The effects of privatising BLA electricity departments would be highly problematic. If privatised in their present form, these undertakings would be unable to extend electricity to new consumers, and may very well be forced to permanently disconnect supplies to present consumers. Without access to subsidised capital from the state it is unlikely that electrification projects in black townships would be financially viable. Privatised distribution authorities would have no incentive to extend electricity provision to low-income areas, since the rate of return on such projects would probably be low. They may be required by their regulators to undertake such projects, but would do so only if provided with subsidies to cover the difference between their costs and the revenue from sales of electricity. In attempts to control costs and maintain profitability, these private companies would also be justified in immediately disconnecting consumers who fell into arrears. On this basis, it would appear that the effectiveness of privately owned distribution authorities would be highly constrained. The ideal of complete electrification of black townships, and the provision of affordable and reliable electricity to all potential consumers could never be achieved. The historic racial bias in access to electricity, where white areas are effectively served, but black townships are not, would not be changed.

The privatisation of Eskom Distribution and Marketing authorities would probably not change their effectiveness substantially. Like privatised white municipal electricity departments, the tariffs charged to end consumers would probably increase significantly.

Finally, the question of privatisation of regional distribution authorities formed after the restructuring of local government should be considered. The points

noted above about the need to undertake the rapid electrification of all black townships, and to extend reliable and affordable electricity to as many homes as possible, apply equally here. A privately owned regional distribution authority would have no incentive to undertake the electrification of low-income areas. As a result, the most pressing task facing the ESI, namely to undertake the rapid electrification of black townships, would simply not occur.

Publicly owned distribution authorities, restructured on a regional basis, with access to cheap capital and the political mandate to undertake large scale electrification programmes, would be well placed to undertake these tasks. Depending on the nature of the system of local government which is established to replace the current system, electricity provision could be carried out by an electricity department within a single non-racial local authority, or by a restructured services council, or by an autonomous regional public corporation.

5.5 Conclusion

Based on the observations made in this chapter it is clear that privatisation of currently existing distribution authorities would be an unsound policy initiative at this time and would be disastrous for attempts to electrify black townships. Whilst white municipal electricity departments could probably be privatised, electricity tariffs charged would probably rise significantly. Existing regulatory systems would need to be investigated and perhaps re-designed to prevent these privately owned distribution authorities from exploiting their monopoly power. Privatisation could arguably result in the introduction of measures to improve the economic efficiency of these enterprises, but many of these measures could potentially be introduced under public ownership. Apart from these reasons, it would be politically unwise to attempt to privatise municipal distribution authorities. As was pointed out in chapter one, most extra-Parliamentary political parties in South Africa are strongly opposed to privatisation.

Electricity distribution authorities operated by BLAs would be impossible to privatise in their present form, since private investors would not be interested in acquiring loss-making assets. It may be possible to make these departments profitable (and therefore saleable) by providing them with ongoing subsidisation.

However, this would push up the costs of operating the entire system, probably without markedly improving the efficiency of such distribution authorities. More crucially, private owners of these electricity undertakings would have no incentives to undertake the electrification of low-income black townships, where financial returns are unlikely to be high at the outset.

The greatest need for electrification currently exists in those areas in which the responsible distribution authorities are also the most organisationally underdeveloped. A strong case can therefore be made for the rationalisation of distribution authorities on a regional basis. Many of the arguments developed above apply equally to the question of privatisation of these restructured regional electricity distribution authorities.

Public confidence in electricity distribution authorities in black townships is currently very low. If the confidence of the public, and their consent to pay for the electricity that they consume is to be restored, then the accountability of distribution authorities to their customers must be restored. This too suggests that electricity distribution authorities should remain within the public sector.

Most importantly, only public sector institutions with access to cheap capital and political support could undertake the task of rapidly electrifying all homes in the country, in attempting to bring affordable and reliable electricity to all. This task must be undertaken if the legacy of racial discrimination in access to services perpetuated under apartheid is to be overcome.

CHAPTER SIX

PUBLIC AND PRIVATE SECTOR ROLES IN THE IMPLEMENTATION OF ELECTRIFICATION PROJECTS IN URBAN AREAS OF SOUTH AFRICA

6.1 Introduction

The aim of this chapter is to examine the roles of public and private sector institutions in the implementation of electrification projects in urban areas of South Africa. The implementation of electrification projects in different urban areas was described in chapter three. The roles currently played by these institutions will be reviewed here, followed by an assessment of what roles might appropriately be played by each in the future. These involvements will be considered in three separate sections, each dealing with a category of tasks that arise from the implementation of an electrification project. These are planning and co-ordination of projects; the design and supervision of construction of new systems; and the construction of new systems. The tasks that fall within these categories were defined in section 3.1, and will not be repeated here.

Private electrical engineering consultants and contractors are extensively involved in the electrification of new black townships and unelectrified black townships. In some cases the contracting out of tasks to these private firms has come about as a result of a decline in the capabilities of public sector authorities. In other cases contracting out has occurred as a result of the failure to create adequate public sector structures in the first place. As has been noted elsewhere, contracting out involves the transfer of economic activity from the private to the public sector, and is therefore a form of privatisation. In contrast to the way in which projects are implemented in black areas, the electrification of new developments within the areas of supply of the larger white municipal electricity departments are usually carried out by in-house planning, design and construction teams. Only smaller, or newly established white municipal electricity departments use outside operators for these tasks.

This chapter, like the chapter before it and the chapter which follows it, is forward looking. Since attempts are likely to be made in the future to accelerate the electrification of black townships, the available skills and resources in the distribution sector of the ESI will need to be applied to maximum effect. This chapter considers ways in which the performance of parties currently involved in electrification projects can be improved.

6.2 Public and Private Sector Roles in the Planning and Co-ordination of Electrification Projects

The tasks involved with the planning and co-ordination of electrification projects were described in chapter three. These tasks are currently carried out by different institutions in different areas. Planning and co-ordination functions for projects within the areas of supply of white municipal electricity departments are normally carried out by their own teams of planners, electrical engineers and draughtspersons. Larger white municipal electricity departments have development branches, or sub-departments, where these people are located. The City of Cape Town electricity department has a Development Department which employed about 50 engineers and draughtspersons in 1988 (Cape Town,1989). White municipal electricity departments tend to have an established approach to project planning and co-ordination, having built up experience in performing these tasks over a number of years. For example, the City of Cape Town electricity department Development Department has learned, through experience, to liaise closely with developers before proceeding with the preparation of final design specifications for a project. As a result, they are able to avoid costly re-design if the plans proposed by developers are later changed (Hyde,1990).

Some smaller white municipal distribution authorities, such as Parow in the Western Cape, contract out some of these tasks, to private electrical engineering consultants. Even so, these small departments would probably still closely monitor the progress of electrification projects themselves.

The planning and co-ordination of electrification projects in new black townships is currently carried out by the provincial authorities. The provincial authorities

are in most instances unable to attract suitably qualified personnel to carry out these tasks. As a result, the preparation of design guidelines for a new area is usually contracted out to private consultants, as is the task of project management. The involvement of the private sector has come about as a result of the decline of the capability of the provincial authorities, rather than through any conscious decision to privatise these functions.

The appointment of private consultants to prepare design guidelines tends to result in the planning process becoming segmented into discrete parts. After the initial design guidelines have been produced, the consultants will submit a report and receive payment for the services rendered. At a later stage it may be necessary to appoint and brief consultants once again, in order to update the design guidelines. The overall effect is to slow down the response to changing circumstances, and to push up the costs of carrying out this process. For example, the original design guidelines for the development of Khayelitsha were produced in 1984 by a consortium of private consultants, and was based on the assumption that formally constructed homes would be developed in an orderly way. The design guidelines have subsequently been revised by other consultants in a series of different stages. The resulting discontinuity of the planning process has probably contributed to the slowness of the provincial authorities in moving to adopt more appropriate approaches to the electrification of the township (Scholtz,1990).

The practice of employing private consultants as project managers to co-ordinate electrification projects is also problematic. Firstly, project management teams have the responsibility of handling all infrastructural development projects, and may not have particular expertise in co-ordinating electrification projects. This problem was apparently experienced at the outset when Bruinette, Kruger and Stoffberg (Inc.) were appointed as project managers of all development projects in Khayelitsha (Basson and Fuller,1990; Scholtz,1990).

Secondly, the project management team has the responsibility of liaising with developers who are installing internal systems in formal housing developments. This task may not be carried out optimally since project managers will probably be using a design guidelines or set of guidelines devised previously by another consultant. Should they become aware of the need to change the approach to internal system installation specified in the design guidelines, their suggestions

would need to be relayed to the provincial authorities, then acted upon, possibly by the appointment of another team of consultants to revise the design guidelines itself.

Thirdly, there is little incentive for project managers to improve their own performance, since the provincial authorities are probably not able to monitor their performance closely; they are paid a fixed percentage of the value of the projects that they handle; and their contracts are not easy to review or terminate because they develop significant expertise and experience which cannot be easily replaced.

Fourthly, the BLA and its electricity department, who ultimately operate the systems, are not involved at any point in planning and co-ordination tasks. This limits the ability of these departments to influence, or plan for, the electrification of the township that they are supposed to serve. For example, the Lingelethu West City Council electrical department has not had any part in the development of the electrical system which serves Khayelitsha, even though it is gaining valuable experience in operating the systems installed.

Where projects are carried out to electrify parts of established black townships, the institution responsible for their planning and co-ordination is formally the BLA in the area. These tasks are almost invariably delegated to private consultants, with the approval of the provincial authorities. In such projects, which are usually confined to a particular area and a certain number of houses, consultants have very wide responsibilities. In such cases, the distribution authority which will operate the system may not be central to the planning or co-ordination of the electrification project. Once construction is complete, and the system has been tested, the consultant is no longer responsible for the project. In some cases this may leave the future of the system hanging in the balance. For example, in the project to electrify 2 278 houses in Nyanga, which was described in section 3.5.3, the consultant was responsible for the initial costing and feasibility study, the detailed design specification, the monitoring of construction, and the preparation of all documentation, contracts and payment invoices. Officials of the Ikapa Town Council were only involved in the signing of formal contracts. The provincial authorities checked the design proposals and assisted with fundraising efforts. At the time of writing (March 1991), the project is close to completion. Yet it is still uncertain which distribution authority will operate

the system, since the Ikapa Town Council has no electricity department.

In conclusion, the points made in this section suggest that the planning and co-ordination of electrification projects can be most effectively carried out if they are the responsibility of the distribution authority which will eventually operate the system being constructed. In this situation the necessary expertise and experience is internalised in the responsible authority, ensuring continuity in the projects carried out. Where these tasks have been carried out by private operators, communication between different parties may not be optimal. Also, whilst consultants can be employed as project managers to fulfil these tasks, public authorities are often not in a position to effectively monitor or improve their performance.

In the future, the rationalisation of distribution authorities in South Africa may simplify planning and co-ordination processes in new areas. In such a scenario, one distribution authority would be responsible for all electrification projects in a sizeable region of the country. Rationalised distribution authorities in each region would have staff who would undertake the task of planning and co-ordinating all electrification projects.

6.3 Public and Private Sector Roles in the Design and Supervision of Construction of New Electricity Systems

The tasks involved in the design and supervision of construction of new electricity systems were described in section 3.1. These tasks are handled by different institutions in different areas. The design and supervision work which arises from new projects inside the areas of supply of the larger white municipal distribution authorities are usually handled in-house. Design teams within their development sub-departments undertake these tasks. It is difficult to determine whether these departments are especially effective or efficient. Even the large electricity departments do not publish detailed information on the cost performance of their separate sub-departments.

The design approach adopted by the large white municipal electricity departments

has traditionally been more conservative than the approach to design in some black townships. Since rates of extension to the network are less rapid, and the availability of reasonably priced capital is less constrained, the in-house design teams ordinarily specify the use of more reliable, more expensive equipment, rather than low-cost systems. Thus, certain components of systems may be generously designed so as to minimise their chances of requiring regular maintenance later. A few white municipal electricity departments, such as the Durban City Council electricity department, have experimented with the installation of cheaper systems. That department has begun to provide electricity to areas of KwaZulu which surround the city. On the whole however, few white municipal electricity departments have yet developed significant experience in the field of low-cost design.

In new black townships, the provincial authorities, or the private project management team, appoint electrical engineering consultants to perform the design and supervision of construction of new electricity systems. The consultants prepare design specifications (based on the more general specifications contained in the design guidelines), control the process of contracting out construction work to electrical contractors, and supervise the actual construction. Developers also appoint consultants to design and supervise the construction of internal electrical systems.

Private electrical engineering consultants are also extensively involved in electrification projects which take place in established black townships. As noted in the previous section, the responsible BLA, with the assistance of the provincial authorities, appoints a consultant to carry out almost all aspects of electrification projects, including design and supervision of construction.

The provincial authorities and BLAs have almost no in-house design and supervision capability and are therefore entirely dependant on consultants to fulfil the tasks mentioned above. Since this situation is one in which an activity has effectively been contracted out, or privatised, it will be examined here in some detail.

An overview of the economic effects of contracting out are provided by Kay, Mayer & Thompson (1986). It is widely observed that competition between a range of private operators for contracts offered by public sector bodies improves

the quality of tenders offered. Competition for discrete contracts by a process of open tendering raises the overall level of efficiency of the successful firms, since less efficient firms are weeded by failing to win contracts. Unfortunately, contracting out is not always competitive. Firstly, the number of operators able to fulfil a particular task may be limited. Thus, private operators will be able to inflate profit margins in tenders submitted and still be awarded contracts. Secondly, the work being tendered for may not be easy to define, thus preventing accurate assessments of the approximate worth of the contract in the first place. In such cases it may not be possible to compare alternative tenders on the basis of price or other convenient criteria.

A second important aspect of contracting out is how the performance of contracts is monitored. Once contracts have been awarded, they may not be easy to monitor. The performance of contractors may therefore be poor. If it is not possible to accurately define contracts, cost and time overruns by may be difficult to prevent.

In order to assess whether contracting out will be successful in a given situation, it is thus necessary to examine whether competition for contracts exists, and whether they can be properly monitored. An assessment of the performance of private electrical engineering consultants therefore requires a closer examination of the procedures whereby they are appointed and remunerated, and the extent to which their work is monitored by provincial authorities, project managers and BLAs.

As was noted in section 3.2, the procedures followed in the appointment of an electrical engineering consultant vary from project to project. The provincial authorities rotate available appointments amongst a list of accredited consultants who are known to have the capacity to undertake work of a particular type. BLAs appoint consultants by similar processes, since their decisions must be approved by the provincial authorities. There is no formal process of competition between consultants. For this reason, factors such as relationships of trust built up between particular design consultants and provincial authority or BLA employees may result in their re-appointment. Firms with better reputations and higher visibility in the industry are also likely to receive more appointments (Gaunt,1990).

Consultants are remunerated in different ways for different projects. The SAACE publishes recommended fee scales annually, which are used by public sector clients, including the provincial authorities. These scales result in a two-part payment, and are based upon the total value of the project. A fixed primary fee and a proportional secondary fee are payable depending on the total value of the project. For example, the current fee for an electrical project where the cost of the works was R1 million would be made up of a primary fee of R7 800 and a secondary fee of 7.5% of the project value (ie. R75 000). The fees paid to consultants average at around 10% of the total value of the project, declining as the value of the project increases. Since the fees earned by a consultant are directly related to total value of the project, there is therefore no immediate incentive for consultants to reduce the total value of the project by innovative design work. In fact, from a strictly short-term financial perspective, an incentive exists for consultants to inflate the total value of the project.

The recommended fee system also tends to overcharge clients for work where the value of the project is high, but the design content is low. Such situations arise where, for example, a consultant is in a position to repeat a design used previously, with only a few alterations, but still to draw the same fee based on the total value of the project. However, the SAACE remuneration scales are provided as guidelines only. The client and the consultant can work out different, mutually agreeable forms of payment.

The SAACE does not permit its members to compete on the basis of fees. In other words, the cost to the client of appointing a consultant will not vary, unless different consultants produce designs that result in different total contract values. Members of the SAACE may not solicit appointments by offering to work for less. The argument forwarded in support of this restriction is that the professional integrity of consultants would be compromised by the need to cut corners in designs to offer lower total contract prices, in order to charge lower fees (Lemmer,1990).

Consultants are usually not closely monitored by the provincial authorities or BLAs. These institutions are understaffed and are often heavily dependant on consultants for design advice, contract design, and contract management. They are seldom in a position to criticise the consultants, except in cases of obvious negligence or when long time delays in the design stage occur.

Thus, the process of appointment of consultants is not formally competitive, since formal tenders from various consultants are not submitted or evaluated and consultants do not compete on the basis of cost. Neither are there strong pressures for them to improve performance as a result of close monitoring by their clients. Furthermore, there are short-run incentives to inflate project costs. On this evidence, it might be suggested that the performance of consultants could very well be poor. Nonetheless it is pointed out, often by consultants themselves, that their work is largely "self-regulated". Consultants are usually appointed for discrete projects often lasting for only a few months. They are motivated by the need to maintain their long-term credibility and market shares, and would therefore not undermine their relationships with important public sector clients by consciously inflating design costs or performing poorly.

In response to criticism about the issue of remuneration, the SAACE is currently giving attention to a remuneration system based on rates for time spent on projects. In such a system, a fixed payment would be negotiated between the client and the consultant on the basis of the time expected to be necessary for the project. The consulting firm would work toward that target, with every incentive to complete the overall task before the due date (Geyer,1990). This system is used in some projects funded by international lending agencies such as the World Bank (Collier,1984).

Private electrical engineering consultants have been extensively involved in the electrification of new and existing black townships in the last decade. Most of these projects have been constrained by a shortage of cheap capital. As a result, consultants have accumulated a great deal of experience in the design of low-cost networks. The use of aerial bundle conductors, low-cost substations, transformers, switchgear and a number of special system configurations in South Africa has been pioneered by private consultants.

In future, the rationalisation of distribution authorities in South Africa will result in the more effective application of existing electrical engineering design and supervision expertise in the country. Regional distribution authorities would probably not be able to undertake all design and supervision tasks themselves, especially if an accelerated programme is envisaged, and would continue to employ outside consultants. Also, the expertise in low-cost system design will continue to be extremely important. Closer monitoring of the performance of

private consultants would probably make their services even more valuable to public sector clients.

In conclusion, it has been seen that the design and supervision of construction by white municipal electricity departments has been centralised in in-house departments and has been conservative rather than innovative. On the other hand, the lack of in-house design capability in the public sector authorities responsible for new electrification in black areas has resulted in an uncritical dependence on private consultants. Despite this problem, consultants have accumulated valuable experience in the design and supervision of low-cost electricity systems. These observations suggest that both public and private sector design and supervision skills will be utilised in the implementation of electrification projects in the future.

6.4 Public and Private Sector Roles in the Construction of New Electricity Systems

The tasks involved in the construction of electrical systems were described in section 3.1. In the areas of supply of large white municipal electricity departments, construction tasks are carried out by in-house construction teams. Construction of both medium-voltage bulk systems and low-voltage internal systems is carried out by these teams. For example, in the City of Cape Town electricity department, the Development Department issues a design and a work order to the Distribution Department. Construction teams within this Department obtain the necessary materials from the central store and carry out the construction job (Hyde,1990).

The quality of construction work done by in-house teams is monitored by the engineers in charge of the project. The cost consciousness of some electricity departments is not high, due to the failure to maintain accurate account of costs of every stage of the process. In this case, construction teams are not driven by the need to save costs.

In new black townships, bulk systems are ordinarily constructed by private

electrical contractors. Low-voltage internal systems are constructed by electrical contractors, on behalf of developers. The construction of new systems in unelectrified parts of established townships is also usually carried out by private contractors.

As was noted in the previous section, competition for contracts and close contract monitoring are both important means of improving the performance of outside contractors. These aspects of the contracting out of the construction of electricity systems will therefore be examined in closer detail.

The awarding of large contracts to private contractors to construct electricity systems is done through the process of formal tender. Prior to this stage, the consultant would have prepared a detailed design specification. Formal tendering involves the publication of tender notices and the issuing of tender documents to all interested contractors. Individual contractors complete these documents, indicating the costs of materials and equipment that they would need to purchase, their labour costs, fixed costs and overheads. Rates for all of these components must be provided, and a final price put to the entire job (Harrod,1990).

The tendering process generally appears to be competitive. For example, in the Western Cape at least four companies usually submit tenders for all sizeable projects. The work being tendered for is also usually clearly defined by the design specification. If tender documents are properly prepared, alternative tenders are easy to compare on the basis of the final price of constructing the works in question. The performance of electrical contractors is also relatively easy to monitor. Since contractors must specify a total cost and an estimate of the time taken to complete the contract, cost and time overruns can be punished by the inclusion of penalty clauses in contracts (Harrod,1990).

Private contractors tend to employ a higher proportion of temporary labour, than their public sector equivalents. As a result, their labour costs are generally lower and they are able to cut their labour costs faster in response in a slump in the rate of construction of new systems. Whilst the periodic retrenchment of workers is not desirable, this flexibility can have positive consequences. For example, contracts can specify that private contractors should employ and train local labour on a temporary basis in the course of construction contracts.

In the course of the construction of a new system the consultant is supposed to ensure that the system is constructed in close accordance with the design specification. Most contracts specify that faults in construction will nonetheless be rectified by the contractor if discovered by the distribution authority staff at a later stage. It is usual for a certain amount of payment owed to the contractor to be retained by the client, usually the BLA, for a period of up to a year. These retention monies are used to offset any costs arising from defective work on the part of the contractor. These disincentives discourage the cutting of corners by the contractor. Should a major problem arise, resulting in substantial losses, an enquiry will be conducted, to determine whether the fault arose as a result of a design fault or of negligence on the part of the contractor. Civil liability claims may subsequently be instituted against the responsible party.

In conclusion, it would appear that construction work can effectively be contracted out to private operators, without serious problems arising and even with some benefits to a distribution authority, and to the wider community.

In the future, the rationalisation of the distribution section of the South African ESI is likely to be coupled with the new initiatives to electrify underdeveloped urban and rural areas. As a result, there will be a need for the rapid expansion of the construction capability of the ESI. It will probably be necessary to promote the formation of small and medium sized electrical contractors in the private sector and to set parameters governing the employment and training practices of the larger private operators. In-house construction teams, mainly comprised of skilled staff, could also be built up to ensure a certain level of continuity in projects. The possibility of in-house teams competing against private contractors for construction tasks could also be explored. These observations suggest that there are likely to be important roles for both the private and the public sector in construction of new electricity systems in the future.

6.5 Conclusion

A few important conclusions can be made on the basis of the content of this chapter. Firstly, the implementation of electrification projects by white municipal electricity departments is centralised in in-house sub-departments, and has

generally not been innovative. This is largely because these departments have had easy access to capital, and have faced manageable rates of growth of new consumers.

Secondly, the implementation of electrification projects in black townships, both new and existing, is heavily dependent on the involvement of private consultants and contractors. This situation has come about as a result of the decline in the capabilities of the provincial authorities and the general inadequacy of BLA electricity departments, rather than conscious decisions to privatise particular tasks. The design work performed by consultants has been particularly innovative in the use of low cost technologies.

Thirdly, it was argued that the tasks involved in the planning and co-ordination of electrification projects are best carried out by staff within the distribution authority that will eventually serve the area. In such situations, problems of discontinuities in the planning process and poor communication between different parties involved in projects can be avoided.

Fourthly, there are both benefits and drawbacks associated with contracting out design, supervision of construction, and construction of new electrical systems to private operators. On the whole, the benefits can be maximised and the drawbacks minimised if competition for contracts is stimulated, and the performance of contractors is closely monitored.

Finally, it is likely that the rationalisation of distribution authorities would allow for better co-ordination and planning of projects and a more consistent, yet innovative approach to system design. The in-house capabilities of the white municipal electricity departments would probably form the core of implementation units in these new authorities. In this scenario there would be ample opportunity for the contracting out of both design and construction tasks to private operators. These observations point towards a more structured and closely controlled mix of public and private sector involvement in the implementation of electrification projects in the future.

CHAPTER SEVEN

PUBLIC AND PRIVATE INVESTMENT IN URBAN ELECTRIFICATION PROJECTS IN SOUTH AFRICA

7.1 Introduction

The aim of this chapter is to examine the issue of public and private investment in electrification projects in urban areas of South Africa. Public investment is defined here as the spending of revenues collected by the state through taxation, on projects which are expected to show some form of return. Private investment is defined here as the spending of domestic and corporate savings, which are channelled through financial institutions, also for the purposes of realising a return.

In chapter four, the sources of funds available to distribution authorities to finance electrification projects were described. These included contributions from developers for the installation of internal service systems, and long-term loans from various financial institutions. It was noted that the access of distribution authorities to loans was dependant on their financial standing and credit history. The financial difficulties experienced by BLAs has limited their access to capital for electrification projects.

Given the capital intensity of electricity networks, the cost of capital to a distribution authority often determines the financial viability of electrification projects. The higher the likelihood of slow take-up rates or low initial electricity consumption, the greater the need for financing at lower rates of interest. Thus, the extent of capital available at subsidised interest rates is vital to the pace of the electrification effort.

Dingley (1990:22) has estimated that the cost of a programme to electrify all houses in South Africa in twenty years would be about R700 million per year. Dingley notes that this amount is approximately equal to 18% of current annual capital expenditure of Eskom, and 1% of the annual budget of the central state.

Whilst the allocation of these amounts seems achievable, these figures do show that the spending needs for infrastructural development, including electrification, in South Africa are very substantial.

Apart from a consideration of the present sources and extent of public and private investment in electrification projects, this chapter also includes a general examination of the roles of public and private investment in urban electrification projects in the future. The chapter ends with a conclusion which draws together the observations made in the course of the preceding sections.

7.2 Public Investment in Urban Electrification Projects

Public investment in electrification involves the spending of tax revenues by the state on projects which are expected to show some form of return. Public funds are spent on electrification projects at central, regional and local levels of the state. At present, budgetary allocations from Parliament are made to the Development Bank of Southern Africa (DBSA), the National Housing Commission, and the Local Authorities Loan Fund, as was described in chapter four. The monies allocated to these funds may be in the form of grants or interest free loans, and their amount usually varies from year to year. Since these institutions are all general development funds, only a portion of the capital that they disburse, commonly around 10%, is used for electrification projects.

Grants and low interest loans from the state enable these development funds to lend money to distribution authorities at concessionary interest rates. For example, the DBSA has made available R25 million to Kwanolec (Pty) Ltd. to electrify KwaNobuhle at an interest rate of 10%, repayable over 20 years (DBSA,1990:42; Henn,1990). In order to be able to make loans at such low interest rates, the DBSA combines funds granted to it by the South African government and funds raised by issuing bonds to private investors through capital markets which pay interest at market-determined rates.

At the regional level in some areas, public funds are channelled into urban electrification projects through Regional Services Councils. Capital is made available in the form of low interest loans. Due to the financial problems in the

operation of BLAs, particularly in the Transvaal, RSC funds are being used to cover BLA budget deficits. Thus, these public funds are being consumed, rather than invested.

At the local level, municipalities save a portion of their annual operating revenues in order to accumulate financial reserves in capital development funds. These reserves are used to finance major capital expenditure. They are derived from rates and from the provision of trading services, including electricity. This does not represent the investment of externally derived public funds, only the accumulation of savings in order to decrease external lending requirements. Nonetheless, in certain cases revenue other than that collected from the sale of electricity is used to finance electrification projects.

Since the tax burden that can be borne by the economy is finite, the state is not able to direct unlimited public monies into development funds. Also, only a portion of the annual state budget can be invested, rather than simply consumed. As was pointed out in chapter one, the decline in the rate of growth of the global economy has lead to falling or stagnant public revenues in states and cities around the world. Meanwhile, the demand for public services has increased and resistance to higher levels of taxation has grown. In developed countries this has led to a situation described by Ammons (1984) as "fiscal stress". In developing countries, which commonly face a range of additional problems such as low productivity, administrative weakness and external debt constraints, the position is often much worse.

South Africa has not been exempt from these problems. The poor performance of the economy over the 1980's has limited the ability of the government to invest meaningfully in the infrastructural development of black areas, over and above its historic reluctance to do so. The capital that has been made available to BLAs, mostly through the National Housing Fund, has not generated any meaningful returns. This is not surprising, since the spending backlogs in black townships are beyond the ability of the existing tax base in these areas to support. As a result of the failure of BLAs to repay loans issued at interest rates as high as 11.25%, their access to further capital is now limited.

In the remainder of this section, the role of public investment in electrification projects in the future will be considered.

In order to make funds available for the accelerated electrification of underdeveloped areas in South Africa, it will be necessary to mobilise both public and private investment. To this end the formation of one National Electrification Fund (NEF) under the control of a National Electrification Board (NEB), has been proposed by Dingley (1990:22). Such structures could be established prior to, or at the same time as the a rationalisation of the distribution sector of the ESI.

Within this scenario, the amount of public funds needed by a NEF would depend on the electrification targets set by the NEB. Based on these targets, the expected cost of project implementation, and estimates of the revenue from electricity sales, the NEF would make loans to restructured distribution authorities on terms acceptable to both parties. The expected return on capital invested in infrastructural development projects in low-income areas should not be unrealistically high. The unstructured and unrealistic approach which has characterised lending to BLAs in the past should be avoided.

Public spending priorities in South Africa have begun to change towards the addressing of racial and geographic inequalities. More resources may be obtained for these purposes since spending on the military is expected to decrease, and the de-racialization of the state may reduce the wastage of public funds. Nonetheless, addressing social needs in the key areas of education, social pensions, health and housing will require massive and sustained public expenditure. It has been estimated that achieving racial parity at white levels in these four areas alone will require a tripling of current expenditure, from 10.7% of GDP to 34.7% of GDP at 1986 Rand values (v.d.Bergh,1990). Since the current level of total taxation in South Africa is already approximately 30% of GDP, increases of this sort could only be sustained if the economy grows, and new expenditure is introduced slowly (Moll et al,1991).

Despite the fact that fiscal resources will be limited, there are a number of reasons why the state should continue to spend public funds on electrification projects in urban areas. Firstly, the economic and human development of the country depends on ongoing public investment in infrastructural systems. Secondly, expenditure on electrification projects will bring about substantial external benefits and economic multiplier effects. The employment provided to those involved in the design, construction and operation of new networks, the increased demand for electrical appliances, and the productive industry stimulated by the provision

of new supplies of electricity are examples of such positive effects. Thus, economic growth can be stimulated through the process of redistribution of wealth.

Based on the above considerations, one can assume that significant, albeit limited amounts of capital from the budget could be set aside for the formation of a NEF, as seed capital. This amount would need to be geared up on capital markets by attracting private investment. Also, loans issued by the NEF would need to be repaid from electricity sales so as to limit the need for fresh fiscal allocations. Furthermore, it is obvious that the productivity of the electricity supply industry in general, and of distribution authorities in particular, will need to improve. Greater benefit will need to be gained from limited financial inputs.

7.3 Private Investment in Urban Electrification Projects

Private investment in electrification results from the expenditure by distribution authorities of funds borrowed from private individuals and institutions. These funds are usually channelled through financial institutions such as assurance funds, mutual funds, banks and building societies.

Banks and building societies loan private capital entrusted to them by private institutions and individuals, to other individuals to buy newly electrified houses. These loans are used to pay housing developers, who are in turn required to pay for the installation of internal service systems. As was pointed out in chapter four, the financial collapse of BLAs has lead to unreasonably large costs for internal systems being passed on to home buyers. The result is that new houses are less affordable.

The major means whereby private capital is mobilized for electrification projects is through the sale of bonds on capital markets. Through their financial intermediaries, private individuals and corporate investors purchase bonds issued by institutions such as the DBSA, the National Housing Fund, the Local Authorities Loan Fund and local authorities themselves. As was pointed out, a portion of the capital raised in this way is loaned to electricity distribution authorities.

The Development Bank of Southern Africa has also recently entered capital markets in order to raise private capital for development projects. Thus far R175 million has been raised, with plans to raise a further R1.5 billion from local and foreign markets in the next five years (DBSA,1990:6). At the end of 1990 the National Housing Commission had outstanding stock issues valued at R398 million on local capital markets, which had been deposited in the National Housing Fund. Of this R191 million was repaid on the December 31, 1990. The remainder is repayable between 1995 and the year 2007. The Local Authorities Loan Fund also has substantial holdings on local capital markets. The total value of stocks issued as at the end of March 1989 was R345 million (Stock Exchange Handbook,1990:324).

The listings of fixed interest-bearing South African Government Bonds provided in the Johannesburg Stock Exchange Handbook of January 1990, indicates that 33 white municipalities around the country have outstanding stock issues, with a total value of around R1.9 billion (Stock Exchange Handbook,1990:324). Black local authorities are also entitled by the BLA Act to raise loans from outside sources, with the prior approval of the administrator. It would appear from the Stock Exchange Handbook that no BLA has yet done so.

The interest rates payable on bonds which have recently been issued vary from 13% in the case of those issued by the Local Authorities Loan Fund, to around 18% for some stock issued by smaller white municipalities. All of these bonds are secured by the state. Together with other issues approved and supported by the Treasury, they are known colloquially as "gilts".

Private capital is invested in these funds in order to realise the earnings which they offer. Bond issues which offer less than the going market returns on bonds of similar risk and duration will not be purchased. Changing economic conditions may cause the value of these bonds on secondary markets to fluctuate. Economic uncertainty, for example, tends to increase demand for gilts, which are perceived as being more secure investments than corporate stocks.

In the remainder of this section, the role of private investment in electrification projects in the future will be considered.

There are a number of ways in which public authorities can encourage the

investment of private capital in particular bond issues. Lobbying of large mutual funds, pension, provident and assurance funds can help to encourage these organisations purchase bonds issued by particular organisations. In the past, large private investors have been persuaded to support organisations such as the South African Housing Trust in this way. The state may also force certain institutional investors to invest a certain proportion of their holdings in a prescribed set of funds. Legislation of this sort, known as the prescribed asset regulations, existed in South Africa until they were scrapped on March 15, 1989. The changing of these provisions led to lower demand on secondary markets for prescribed bonds, including Eskom stocks (Eskom,1990a).

Given limits on the availability of public funds for electrification due to competing fiscal priorities, the mobilisation of private capital for an accelerated electrification programme will be essential. Funds might be raised primarily through the sale of fixed-interest bonds by a National Electrification Fund, as suggested above. If needs be, the option of re-introducing prescribed investment regulations to concentrate private funds in this area may be considered. In either case the cost of lending, as indicated in the interest rate offering needed to attract market support, could be reduced by treasury guarantees of the bonds issued. The capital raised in this manner could be combined with capital obtained from the state at lower interest rates. Thus capital could be lent to regional distribution authorities at reasonable rates of return.

A variety of financial instruments other than standard treasury secured bonds may also be issued. For example, revenue bonds, where return is linked to the performance of particular electrification projects, may also be considered.

Finally, access may be sought to foreign concessionary loan finance from organisations such as the World Bank.

7.4 Conclusion

A few important conclusions emerge from the observations made in this chapter. Firstly, public investment in electrification projects is currently made through state-sponsored development funds and the RSC system, but has not been

effectively used to advance electrification projects in black townships. Secondly, public funds are limited and electrification will only be one of a number of important spending priorities in the future. Thirdly, the mobilization of private capital for electrification projects in the future will be essential, and will probably be contingent upon the rationalisation of distribution authorities. The central state has an important role to play as the catalyst of this process, by establishing the necessary institutions and allocating seed capital.

Fourthly, available capital must be used as effectively and as efficiently as possible, so as to maximise its positive effect. Finally, the formation of a National Electrification Fund under the control of a National Electrification Board has potential to combine both public and private capital and streamline the system of financing electrification projects. These observations point towards the importance of public sector leadership, and a mix of both public and private investment in electrification projects.

CHAPTER EIGHT

CONCLUSION

The aim of this chapter is to draw together the most important observations made in the course of this study.

At the outset, the focus of this study on public and private sector involvement in electricity provision was justified on the basis of the social and economic nature of electricity provision, the global and national significance of privatisation, and on the importance of this issue in debates about institutional restructuring in order to widen access to services in South Africa.

Chapters two, three and four of this study were primarily descriptive. Using case studies and general material, three aspects of the distribution sector of the South African ESI were described. These were the range of existing electricity distribution authorities in South Africa; the process whereby new areas are currently electrified; and the ways in which these projects are financed.

The most obvious observation about the distribution sector of the ESI is that it is highly fragmented. Electricity departments exist in most of the 520 white municipalities around the country, some having served consumers for more than a century. The apartheid principle of "separate development" led to the creation of another range of distribution authorities black areas, which are run by BLAs, RSCs, "homeland" corporations and municipalities, and privately-owned companies. This fragmentation has resulted in dis-economies of scale and other institutional and financial problems. Staff and capital shortages limit the capabilities, efficiency and effectiveness of small distribution authorities.

White municipal electricity departments are highly profitable. Most generate surpluses of 10% of expenditure or more. They are financially sound, and can in most cases raise sufficient capital to install new electrical systems whenever and wherever necessary. Based on statistics presented for one of the largest (and presumably one of the most efficient) electricity departments, that of the City of Cape Town, it would appear that the economic efficiency of these departments is low by international standards. Efficiency has also probably not improved

appreciably in the last decade, despite active programmes aimed at raising productivity. Contributing to this problem is the fact that many of these departments are struggling to retain younger personnel with management potential.

Despite these problems, white municipal electricity departments have been effective in supplying electricity to almost all potential consumers in their racially defined areas of supply. Many of the larger departments are completely self-sufficient in the implementation of electrification projects in new areas. They employ planners, design engineers, draughtspersons and labourers to perform all aspects of these projects. Given their experience, their easy access to capital and the relatively modest rates of system expansion with which they have to deal, their approach to these projects has generally not been especially innovative.

The current system of financing electrification projects, whereby loan finance is channelled from state supported loan funds to local authorities, functions effectively in meeting the needs of financially strong white municipal electricity departments. Since they have secure revenue sources and relatively small total debts, they are able to meet all their loan commitments.

The failure of BLA electricity departments to effectively serve black townships derives from fundamental weaknesses in their institutional design. Popular opposition to BLAs has resulted from their political origins as well from their poor performance, and has severely limited their ability to act as agents of meaningful development in black townships. The system whereby loans for infrastructural development are allocated to BLAs on a cost recovery basis at substantial (albeit concessionary) interest rates, has saddled them with unpayable debts. Since they are unable to repay debts within this system, they no longer have sufficient access to capital for development projects.

Due to their organisational underdevelopment, BLA electricity departments are not in a position to efficiently utilise available resources. They also have no in-house capabilities to undertake the implementation of electrification projects. The capabilities of the provincial authorities, who are supposed to assist them in this respect, have also decreased. As a result, the implementation process of electrification projects in black townships is heavily dependant on the involvement of private electrical engineering consultants, project managers and electrical

contractors. In some cases, systems are constructed by private contractors, at the direction of one consultant, who is in turn co-ordinated by second consultant, who is in turn using design guidelines devised by a third consultant. In such cases the provincial authorities maintain only an outside interest, while the BLA which is to become the distribution authority in the new area is not involved at all. Not surprisingly, this sometimes results in the sub-optimal execution of projects.

The current system of financing electrification projects does not function adequately for projects in black townships. This is because of the financial collapse of BLAs. The huge spending backlogs, and the low rates of payment for electricity in many townships, does not allow for infrastructural development to be funded from external sources on a cost recovery basis. For similar reasons, developers of new houses in black townships are required to pay for a significant part of the installation of bulk electrical systems. As a result, the cost of houses in these areas, already out of reach of most black South Africans, is inflated. Due to inappropriate emphasis on the electrification of only formal houses, houses in new site-and-service schemes are not being provided with electricity.

Based on a knowledge of these problems, chapters five, six and seven of the study turned to the issue of the involvement of public and private sector institutions in different aspects of electricity provision in urban areas. The benefits and disadvantages of different institutions performing particular roles was examined. Present situations as well as future scenarios were considered.

It was concluded that there are a number of aspects of electricity provision in urban areas which are most appropriately carried out by public sector institutions. Firstly, it was concluded that electricity distribution authorities themselves should remain in the public sector for the foreseeable future. This was based on the observations that the privatisation of existing distribution authorities would be an unsound policy initiative at this time, and that privatisation would be disastrous for attempts to electrify black townships. Whilst white municipal electricity departments could probably be privatised, electricity tariffs charged would probably rise significantly. Regulatory systems would need to be designed to prevent these privately-owned distribution authorities from exploiting their monopoly power. It was also argued that the economic efficiency of these enterprises would not necessarily improve significantly under private ownership.

Electricity distribution authorities operated by BLAs would be hard to privatise in their present form. The private sector is unlikely to be interested in the acquisition of loss-making assets. It might be possible to make these departments "profitable", and therefore saleable, by providing them with ongoing subsidisation. In this case public funds would be used to ensure good returns to the private owners the distribution authorities. Again, the efficiency of such distribution authorities would probably not improve significantly. More importantly, private electricity undertakings would have no incentives to undertake the electrification of low-income black townships, a crucial task which is likely to be undertaken in the future.

It was concluded that only publicly owned distribution authorities with experienced staff, access to cheap capital and widespread political support could undertake the task of rapidly electrifying all homes in the country. Thus, a strong case was made for the regional rationalisation of distribution authorities, located within the public sector and based primarily on the electricity departments of the white municipalities. Public sector leadership will be required to bring affordable and reliable electricity to all. This task must be undertaken if the legacy of racial discrimination in access to services perpetuated under apartheid is to be overcome.

It was also concluded that the planning and co-ordination of electrification projects is best carried out by public authorities. It was argued that these tasks are best carried out by staff within the distribution authority that will eventually serve the area. In such situations, problems of discontinuities in the planning process and poor communication between different parties involved in projects can be avoided. Once again, this pointed to the need to create a number of regionally rationalised, public electricity distribution authorities.

However, these observations did not indicate that an uncritical attitude should be allowed to develop towards the performance of public distribution authorities. It was suggested that these institutions could be subjected to "external" regulation from another public sector body. These distribution authorities would need to function effectively, apply innovative design and construction methods, and make maximum use scarce resources.

It was noted that considerable project management, design and construction

expertise exists in South Africa amongst private operators, particularly with regard to the installation of cost effective electricity systems for low-income areas. Where these tasks had been contracted out in the past it was noted that more competition for contracts, and better monitoring led to improved contract performance. It was also concluded that the contribution of private consultants and contractors would still be required after the rationalisation of distribution authorities, particularly if an accelerated electrification effort were to be undertaken. Thus, a more structured and closely controlled private sector involvement in the implementation of electrification projects was suggested.

With regard to public and private sector investment in electrification projects it was noted that electrification would remain only one of a number of important public spending priorities in the future. The mobilization of private capital for electrification projects will therefore also be essential. The formation of a National Electrification Fund could be a means to usefully combine both public and private capital and streamline the system of financing electrification projects. The central state has an important role to play as the catalyst of this process.

Finally, the formation of a widely representative National Electrification Board, as suggested by Dingley (1990:22), has the potential to advance the electrification effort. Such a body could set standards for the performance of both private and public sector institutions, formulate policy, set targets and priorities, and allocate resources to distribution authorities.

In summary, the key challenges facing the ESI in South Africa will best be met if the distribution sector is restructured on a regional basis in order to utilise existing expertise, and retained within the public sector. Accelerated electrification initiatives, planned and co-ordinated by these distribution authorities, would draw upon the experience and capabilities of private electrical consultants and contractors. Public sector leadership in mobilising both public and private investment will also be necessary. Thus, whilst public institutions would be dominant, important roles would remain for the private sector in the provision of electricity in urban areas of South Africa. The results of this study suggest that far from privatising service provision in South Africa, it will be essential to allocate a dominant role to the public sector in widening access to services to all.

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